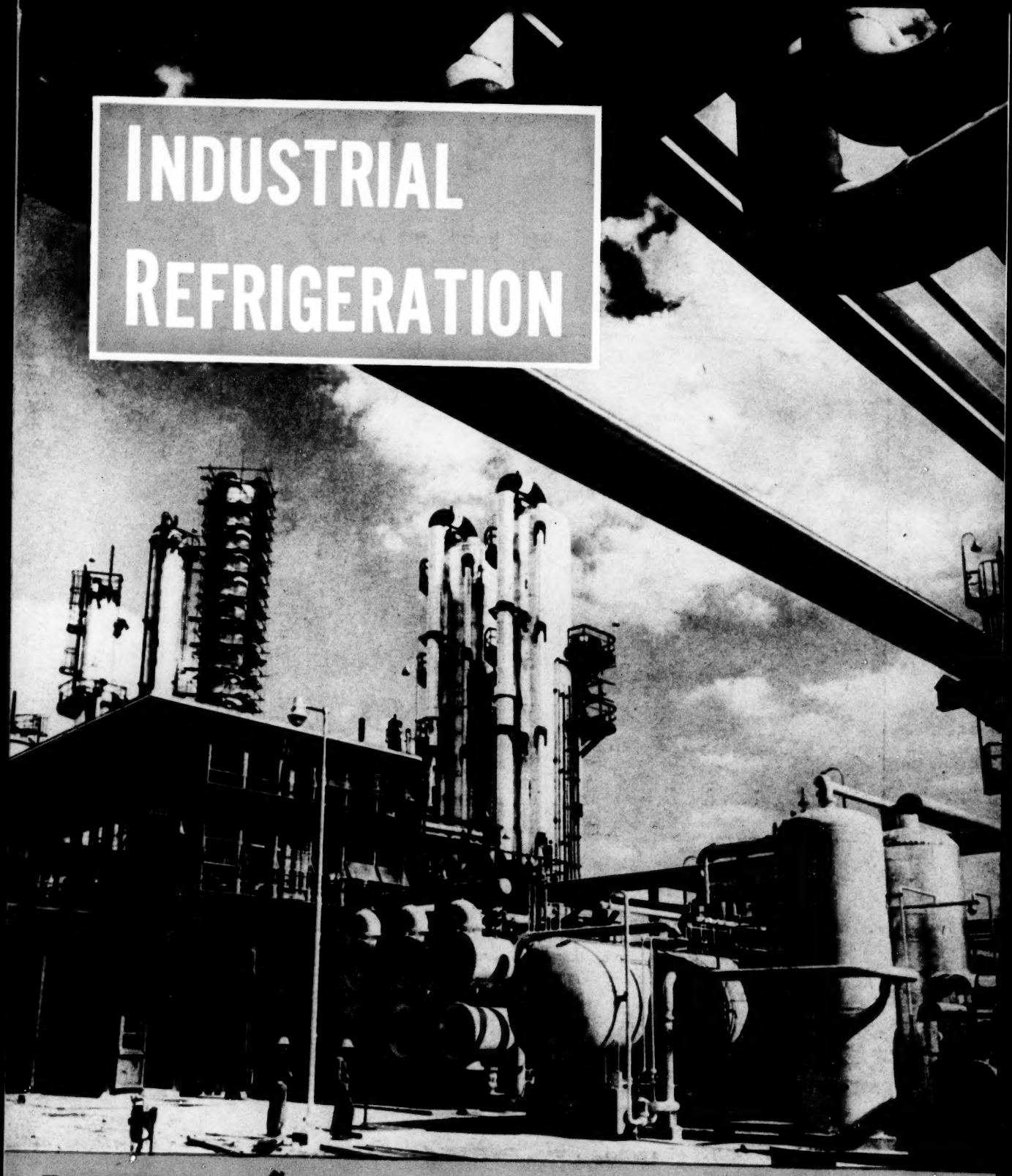
INDUSTRIAL REFRIGERATION

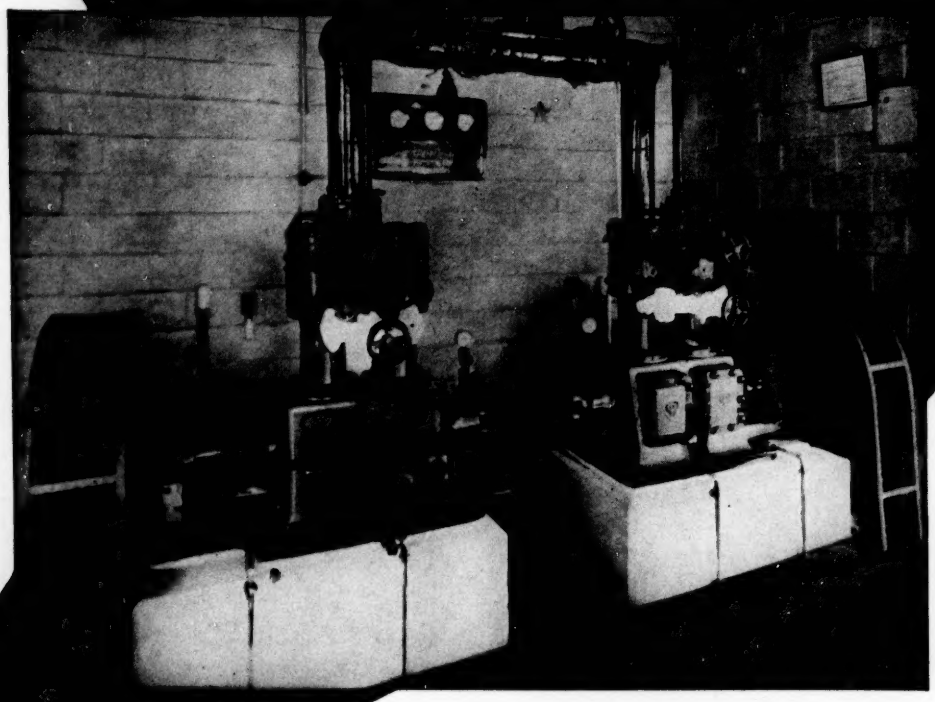


Formerly Refrigeration

Refrigeration Plant Extracts Chemicals From Gas . . . . Page 15
The Control and Prevention of Corrosion . . . . . Page 20
New Freezer-Storage Annex Speeds up Operations . . Page 22
New Packer-Warehouse Addition Built in 100 Days . . Page 27

MARCH, 1954

Use the WAXFREE Oil



FOR DEPENDABLE, trouble-free performance, keep compressor systems free from wax. Use *Texaco Capella Oil (Waxfree)* — the oil that *won't wax out in systems even down to minus 100° F.*

The outstandingly low haze and floc temperatures of *Texaco Capella Oil (Waxfree)*, its great stability and resistance to oxidation, assure clean, smooth compressor operation. In addition, *Texaco Capella Oil (Waxfree)* is non-foaming, moisture-free and campatible with all types of refrigerants.

There is a complete line of *Texaco Capella Oils (Waxfree)* to meet all compressor and operating requirements. You can get them in 55-gallon and 5-gallon drums, 1-gallon cans, and the more widely used grades in 1-quart containers — all *refinery-sealed* to protect purity and quality.

A Texaco Lubrication Engineer will gladly help you select the right one. Just call the nearest of the more than 2,000 Texaco Distributing Plants in the 48 States, or write:

☆ ☆ ☆

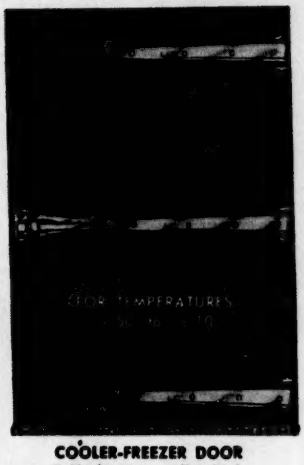
The Texas Company, 135 East 42nd Street, New York 17, N. Y.

TEXACO

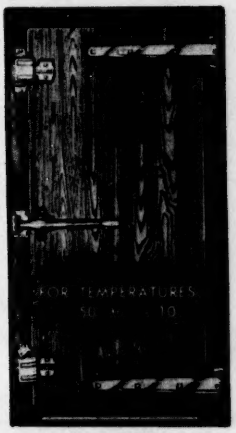
TEXACO Capella Oils (Waxfree)

FOR ALL REFRIGERATING AND AIR CONDITIONING COMPRESSORS

TUNE IN . . . METROPOLITAN OPERA radio broadcasts every Saturday afternoon. See newspaper for time and station.

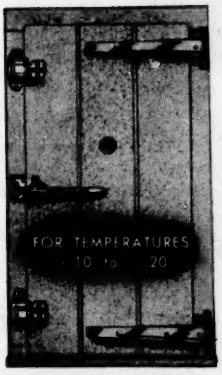


COOLER-FREEZER DOOR
- Modern streamlined job
- 100% "Douglas Fir"
- Sanitary hardware



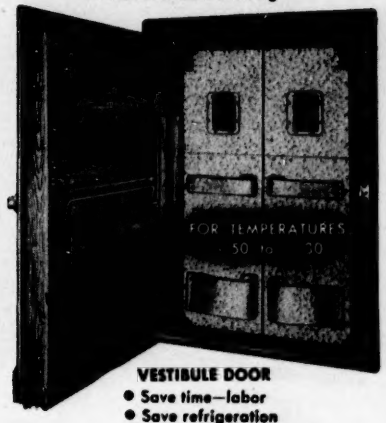
X-52 PLYWOOD PANEL DOOR
- Plywood front and back
- Extra heavy-duty hardware
- Special type gaskets

- Maximum insulation fill
- Most possible rigidity
- Allows reversal of swing



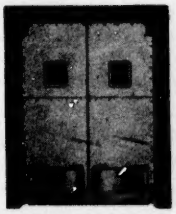
LOW TEMPERATURE DOOR
- Entire metal-clad front
- Extra heavy-duty hardware
- Special type gaskets

SUPER FREEZER (OVER-LAP) DOOR
- Extra-heavy construction
- Extra-heavy duty gaskets
- Extra heavy-duty hardware

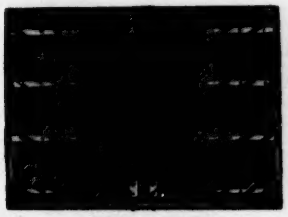


VESTIBULE DOOR
- Save time—labor
- Save refrigeration
- Large plant operation

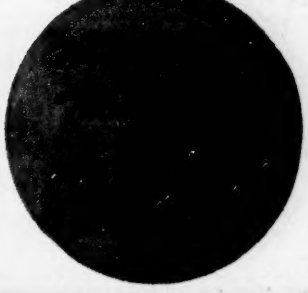
TRACK DOOR
- For abattoirs
- Meat handling rails
- Banana rooms



AUTO-CLOSE DOOR
- For loading dock
- Intra-cooler doors
- Heavy trucking



DOUBLE DOOR
- For palletizing
- For carloading
- For elevator shafts



BUTCHER BOY REFRIGERATOR DOOR CO. • HARVARD, ILL.

New

SAVES WATER and CUTS MAINTENANCE COSTS . . .

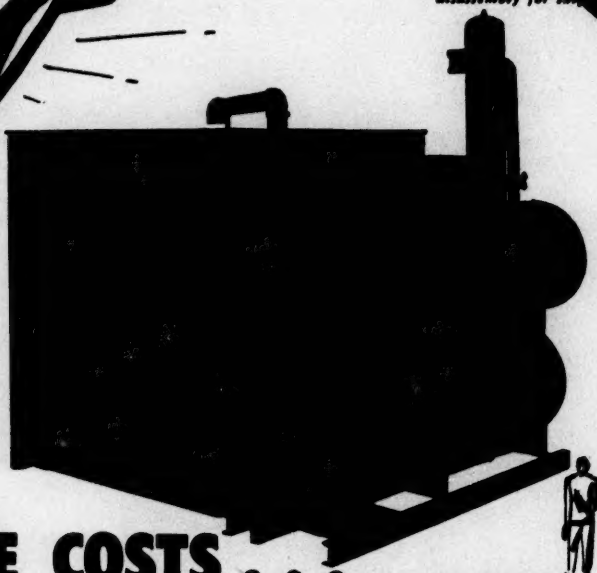
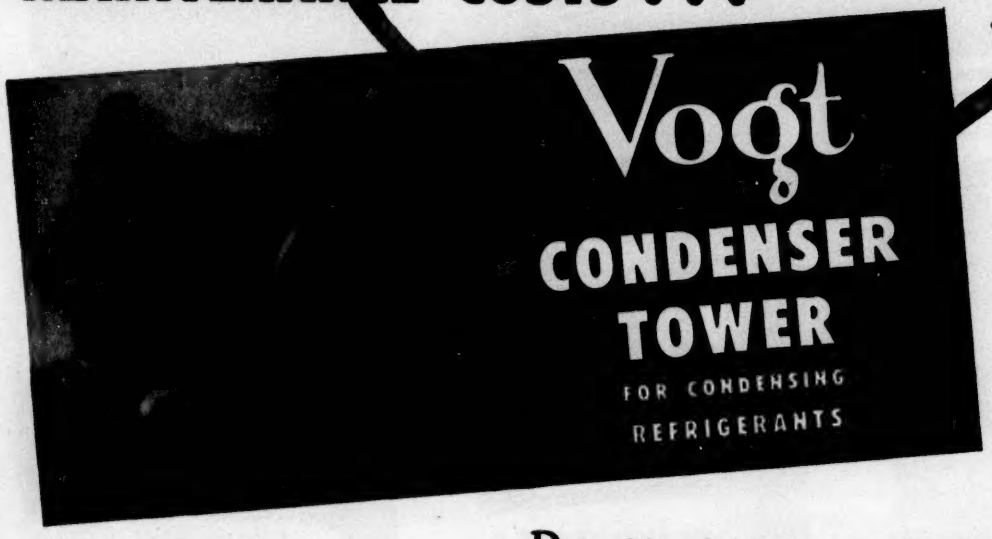


Illustration shows two views of a 55 ton Condenser Tower prior to partial disassembly for shipment.



SINGLE RESPONSIBILITY:

Vogt, leading builder of refrigeration condensers, assumes responsibility for engineering the unit. Only one purchase order needed.

SHOP FITTED:

To cut down field assembly labor. Requires no cutting or fitting of pipe.

Designed for today's water conservation requirements, and to keep refrigeration costs low, the *new* Vogt Condenser Tower meets the need for a proven, readily cleanable condensing unit.

The Vogt Condenser Tower consists of a multipass straight tube condenser, a receiver, an oil trap, a cooling tower, and a water pump. Removable cast iron heads permit easy cleaning of the condenser tubes.

Water costs are extremely low since the cooling water is recirculated continuously and requires only a small amount of makeup to replace losses due to windage and evaporation.

Condenser Tower units are available in capacities ranging from 5 to 50 tons refrigeration. Additional information will be furnished upon request.

HENRY VOGT MACHINE CO., Louisville 10, Kentucky

BRANCH OFFICES NEW YORK PHILADELPHIA CLEVELAND CHICAGO ST LOUIS DALLAS CHARLESTON W VA

LETTERS

(Letters to the editor are welcomed from readers of INDUSTRIAL REFRIGERATION on any subject of general interest.)

Industrial Refrigeration Helpful to Engineer

Auckland, New Zealand

I WOULD like to let you know how much I enjoyed the experience of attending the 44th convention of the NAPRE at Purdue University because it was through my familiarity with your journal during the past few years, that I was able to plan my journey through your country so easily and quickly.

One of the projects my company is interested in at present, is a new refrigerated butter store and we have therefore followed with great interest, your description and illustrations of modern refrigerated warehouses in the United States, and corresponded directly with many of your contributors of those descriptive articles.

It is a satisfying experience to be able to follow up such articles by visits to the actual job and I affirm much of the evidence I saw on building construction, on design for mechanical handling, as well as on refrigeration plant, will be very helpful here in New Zealand.

WM. J. SYME
Superintending Engineer
Auckland Farmers' Freezing Co. Ltd.

Pleased with Picture Story

Syracuse, N. Y.

THIS will acknowledge receipt of the January issue of INDUSTRIAL REFRIGERATION. All of us here in Syracuse who had anything to do with putting together this picture story (Refrigeration Installation in Denver, Colo. Cold Storage Warehouse and Freezer) were very pleased with the size of these photographic illustrations as well as the general layout. Our thanks to you for the splendid way you handled this material.

ARMIN W. HEINTZ
Carrier Corp.

Storage Space Information

Richmond, Va.

Our staff has read with keen interest your article "To Build or Rent Refrigerated Storage Space" in the January issue of INDUSTRIAL REFRIGERATION. We believe there is an abundance of factual information contained therein that may be of great value to users of refrigerated space who may be contemplating building their own warehouses.

F. E. LAUGHON, President
Richmond Cold Storage Company, Inc.

Industrial Refrigeration

formerly ICE AND REFRIGERATION

Now in its 62nd Year of Publication

J. F. NICKERSON, FOUNDER

VOL. 126 MARCH, 1954 NUMBER 3

Contents

10,000 Ton Refrigeration Plant to Manufacture Chemicals.. 15
Japanese Refinery Installs Compressors for Dewaxing..... 19
Handling Operations Speeded up in New Freezer-Storage....20
Frozen Food Packers Review Records at Annual Convention 36
Big AWA-NARW Convention Planned 40
Cold Storage Holdings 42
Mechanical Refrigeration Safety Code Revised 46
National Association Practical Refrigerating Engineers..... 27
Warehouse Addition Built in 100 Days 27
News Notes and Chapter Activities..... 29
NAPRE Question Box 32

Departments

What's New in Equipment 4
Press Briefs 10
Coming Conventions 51
Deaths 52
News of People 52
Manufacturers News 53
Catalogs and Bulletins 54

The Cover:

● *Enough cold is created in this refrigeration compressor building of National Petro-Chemicals Corporation's extraction plant at Tuscola, Illinois to make a daily supply of more than 287 million average-sized ice cubes. The extraction unit is where heavy hydrocarbons are removed from 400 million cubic feet of natural gas each day. Three 2425-ton propane refrigeration compressors, housed in the building at the far left, provide refrigeration for the extraction unit. To the right of the building are the six condensers, the surge drum and the vertical flash tanks. Story on page 15.*

Published Monthly by NICKERSON & COLLINS CO.

General Offices: 433 N. Waller Ave., Chicago 44, Ill. Telephones: AUstin 7-1303-04-05

H. T. McDERMOTT, EDITOR AND PUBLISHER · E. R. CURRY, MANAGING EDITOR · J. R. KELAHAN, TECHNICAL EDITOR · H. D. BUSBY, ASSOCIATE EDITOR

ADVERTISING—O. RHODIUS ELOFSON, DIRECTOR · EDW. DAVIESON, Advertising Representative

L. R. TOWNSLEY, GENERAL MANAGER · HELEN G. SMITH, ASSISTANT MANAGER · E. P. SWANSON, SUBSCRIPTION · V. S. SMITH, PRODUCTION

CHANGE OF ADDRESS—Notify publisher and your local post office promptly of change of mailing address to avoid non-receipt of copies. Copies incorrectly addressed, because of failure to notify publisher, cannot be replaced. Upon request, post office will provide, without cost, convenient "change of address" mailing cards.

INDUSTRIAL REFRIGERATION, Vol. 126, No. 3. Published monthly at 433 N. Waller Ave., Chicago, Ill., U.S.A., by Nickerson & Collins Co. Yearly subscription in the U. S., $2.00 per year; other countries, $3.00. Single copies, 25 cents.

Copyrighted 1954 by Nickerson & Collins Co. Acceptance under Section 34.64 P. L. & R. authorized.

The entire contents of this journal are covered by general copyright, and special permission must be obtained from the publishers of same before reprinting long extracts or reproducing illustrations; but editors desiring to do so are welcome to use not more than one third of an article, providing credit is given.

Industrial Refrigeration is indexed regularly by Engineering Index, Inc., and is microfilmed for library use by University Microfilms.

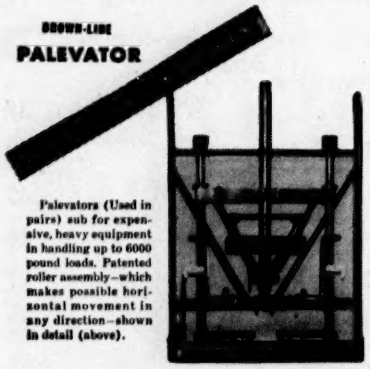
What's New

MACHINERY
APPLIANCES • PROCESSES

For your convenience in securing additional information on any product desired, write the Readers Service Department.

Palevator Helps Make Materials Handling Easy

A NEW development in materials handling equipment, the Palevator, is being offered by the Brown-Line Corporation of Beverly Hills, California. Built to move horizontally in any direction, the compact Palevator units are equipped with hydraulic lift and can be operated in the closest quarters and in locations ordinarily regarded as inaccessible. Operated in



Palevators (Used in pairs) sub for expensive, heavy equipment in handling up to 6000 pound loads. Patented roller assembly—which makes possible horizontal movement in any direction—shown in detail (above).

Brown Line Palevator

pairs, one at each side of the load, the Palevators lift and transport pallets and are useful both in loading and unloading, whether it be in a warehouse, railroad car, truck or ship's hold. Palevators also are equipped with adjustable forks which make it possible to lift from the floor level itself.

In forward or backward motion, the Palevator works on a 26 inch wide roller. To move a load side-wise, a workman releases a plunger which locks the master roller and exposes a series of small transverse rollers in a slot at the bottom of the master roller. Hence a load can be lifted hydraulically and maneuvered in any direction with a minimum of manpower and space.

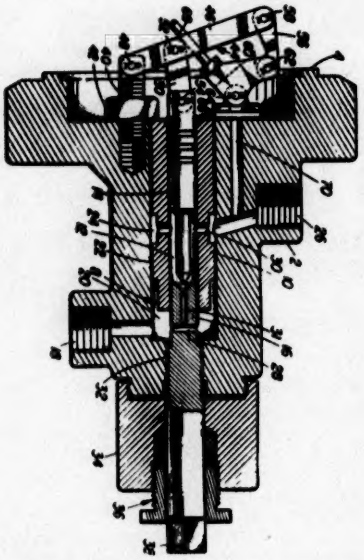
Palevators come in two sizes, one with a 2½ inch master roller and the other with a 5 inch master roller. Lift capacity on the lighter model is 2500 pounds and on the heavier, 6000 pounds. Weights are 58 and 100 pounds, respectiveiy. Either model can be stored in a space less than a foot wide and 36 inches deep.

Pallet Dollies

EASY steering pallet dollies, light weight pallet dollies and heavy duty, floor-protecting dollies; also refrigerated car pallet dollies and roller ramps are illustrated and described in a new bulletin issued by Samuel Olson Mfg. Co., Chicago.

Refrigerant Float Valve

A VARIATION of refrigerant float valve has been developed by G. H. Hickok, L & E Utilities, Naval Supply Depot, and J. A. Solomon, P. W. Utilities, U. S. Naval Station, Seattle. Original disclosure and patent application was made through A. W. Freed, Jr., to Mr. Paul M. Klein, Jr., Attorney, Branch Office, U. S. Naval Research, San Francisco. The U. S. Government has a royalty-free license to use this device, but all commercial rights are held by the inventors. It is reported that this type of valve has been in constant use on four 20-inch diam. x 16 ft. ammonia brine coolers and two blower type evaporators since Oct. 12, 1948, with no reseating or repairs of any kind. The inventors are investigating the marketing of this device.



Hickok-Solomon Valve patented by Civilian Naval Personnel.

The advantages of this float valve as listed in the patent papers, are to provide a needle type valve having a minimum of frictional surface, the capacity of which is variable in an infinite number of steps over its full range from zero to maximum tonnage, and which is provided with a means for limiting the maximum flow of refrigerant in the event of a break in the operating linkage; to provide a compact, reliable lever system for operating the valve, with a large lever ratio sufficient to prevent sticking or freezing of the valve in either open or closed position; to provide means accessible from the exterior of the valve assembly, for adjusting the valve to control the flow of refrigerant over the full range of the valve without shutting down the system of which the valve assembly is a part; to provide that the parts most subject to wear (needle and seat) can be removed by isolating the float chamber and pumping it down, at which time the needle and seat can be removed without taking the valve body from its position in the float chamber.

Travelling Workshop Demonstrates Wrap-Pak

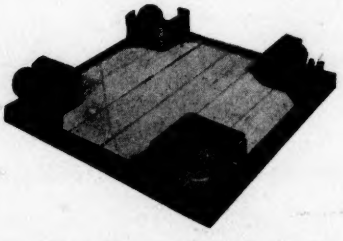
A PACKAGING workshop on wheels, equipped to demonstrate packaging food products in a new aluminum-foil container, is touring the nation for Reynolds Metals Company, to introduce the firm's new refrigerated and frozen food container, the Reynolds Wrap-Pak.

The demonstration unit, housed in an aluminum trailer, is equipped with a Hayssen Automatic Machine, for demonstration packaging of food items in the Wrap-Pak, which consists of an aluminum foil tray, serving as the actual food container, a board cover (plain or foil-laminated) and a Reyseal (foil-laminated sheet) overwrap, which may be attractively color-printed. The combination of the aluminum tray and the foil-laminated overwrap, Reynolds says, gives eye appeal, protection against dehydration, and reduces freezing time up to 30 per cent.

The Hayssen Manufacturing Company, Sheboygan, Wisconsin, and other manufacturers of packaging machinery, are supplying equipment for automatic production of the package, or will modify existing equipment to handle the new container.

Shielded Casters on Dolly

A HEAVY-DUTY dolly, fitted with guards to protect casters when dolly is lifted by a fork truck, has been designed by Crescent Metal Products, Inc., Cleveland, Ohio. Swivel-type casters are fitted with plungers that



New Heavy Duty Dolly

can be engaged to lock casters at a fixed position. Aluminum-magnesium construction is used to provide a lightweight unit, easy to move and carry. Platform has magnesium, aluminum or hardwood surface which is engineered to give required strength and rigidity. Other models and styles are available for various material handling needs.

ARMOUR AMMONIA IS PRE-TESTED FOR QUALITY

Purity tests prevent "freeze-ups" and corrosion

Inspecting cylinder

Qualitative analysis

Checking the seal

Every 100- and 150-lb. cylinder of Armour ammonia must pass rigid tests before it's rushed to a customer. The empty cylinder is carefully inspected, painted, and filled with ammonia of 99.98% purity by test. As each cylinder is filled, the ammonia is subjected to an exacting qualitative analysis. Then the cylinder is sealed—your guarantee that your ammonia is just as it was when it left our plant.

These tests prove that Armour ammonia is pure, dry and free from non-condensable gases and oil. That's why our customers rely on Armour ammonia to prevent ice in evaporators, "freezing up" at expansion valves, corrosion and other damage. For dependable ammonia and service, call the Armour office nearest you—they're listed at right for your convenience.

ARMOUR *Ammonia Division*

Armour and Company • 1355 W. 31st Street • Chicago 9, Illinois

Wherever you are, there's an Armour office within reach of your telephone. So call and get acquainted with your Armour ammonia salesman today!

Birmingham, Ala.	37225
Little Rock, Ark.	9135
Los Angeles, Cal.	Michigan 8181
Oakland, Cal.	HI 4-7420
Sacramento, Cal.	GI 3-7424
San Francisco, Cal.	GA 1-8650
South San Francisco, Cal.	JUno 8-7714
Denver, Colo.	Tabor 8121
Waterbury, Conn.	3-3181-2-3-4-5
Washington, D. C.	MEtropolitan 3366
Jacksonville, Fla.	4-6841
Miami, Fla.	3-4736
Tampa, Fla.	2-2621
Atlanta, Ga.	Elgin 0331
Columbus, Ga.	2-2367
Savannah, Ga.	3-4517-8-9
Chicago, Ill.	LAfayette 3-7000
National Stock Yards	Bridge 1220
Sioux City, Ia.	8-7511
Kansas City, Kan.	Fairfax 4450
Louisville, Ky.	Jackson 4321
New Orleans, La.	Raymond 3301
Shreveport, La.	34237
Baltimore, Md.	Saratoga 1900
Boston, Mass.	GA 7-8110
Worcester, Mass.	2-5633-4-5-6-7-8
Detroit, Mich.	Woodward 1-3502
Minneapolis, Minn.	AT-4501-8
South St. Paul, Minn.	LaSalle 6481
St. Paul, Minn.	GA 4351-6
South St. Joseph, Mo.	8-0661
St. Louis, Mo.	Main 3600
South Omaha, Neb.	Market 5400
North Bergen, N. J.	Union 7-1776
Passaic, N. J.	Prescott 7-0300
Paterson, N. J.	Sherwood 2-8040-1-2-3-4
Brooklyn, N.Y.	EV 7-3900
Buffalo, N. Y.	MA 1413
New York City, N. Y.	Longacre 4-5955
Rochester, N. Y.	Locust 3570
Syracuse, N. Y.	76-5391
Yonkers, N. Y.	Y-5-4422-3-4
Charlotte, N. C.	3-5152-3-4
Cincinnati, Ohio	Cherry 1333
Cleveland, Ohio	Endicott 1-1160
Columbus, Ohio	Garfield 2161
Toledo, Ohio	Adams 9131
Oklahoma City, Okla.	79-2551
Tulsa, Okla.	37151-2-3
Portland, Ore.	Twinoaks 1151
Philadelphia, Penna.	Poplar 5-0100
Pittsburgh, Penna.	Hemlock 1-1200
Pittsburgh Prov. & Packing Co., Penna.	GR 1-2460
Providence, R. I.	EL 1-1400
Chattanooga, Tenn.	6-4725
Knoxville, Tenn.	3-5135-6
Memphis, Tenn.	5-4311
Amarillo, Tex.	6-5246
Corpus Christi, Tex.	6-5246
Dallas, Tex.	Edgemont 2-3735
El Paso, Tex.	3-3621
Fort Worth, Tex.	Market 2101
Harlingen, Tex.	2050
Houston, Tex.	Capitol 1175-5
Lubbock, Tex.	5596
San Antonio, Tex.	Garfield 5321
Richmond, Va.	3-1876
Roanoke, Va.	7751-2-3
South Norfolk, Va.	66-2441
Seattle, Wash.	Elliot 7180
Spokane, Wash.	Lakeview 1541
Charleston, W. Va.	27-165
Milwaukee, Wisc.	MA 8-6200

AGENTS

Indianapolis, Ind.: A. Hoffman Co.
State Life Building . . . . Market 8666

Nashville, Tenn.: Sanders, Inc.
712 8th Ave., S. 6-7111

Tampa, Fla.: C. Scott Johnson
3502 Nebraska Ave. 2-1495

OZITE
PIPE
COVERING
INSULATION
GIVES

More Elbow Room!

OZITE All-Hair felt lasts a lifetime . . . applies without waste . . . is easy to install for curves, straight pipes or valves . . . renders low conductivity for efficient heat barrier . . . allows close temperature control . . . provides maximum capacity of refrigeration units. . . cuts power consumption.

Get the facts about time-proved OZITE.
Write for 4-page Bulletin #300.

NO SHAPE IS TOO COMPLEX

AMERICAN HAIR & FELT COMPANY
MERCHANDISE MART • CHICAGO 54, ILLINOIS

New Equipment—Continued

Steel-Reinforced Flooring

A NEW advancement in the field of industrial flooring is announced by The United Laboratories, Inc., Cleveland, Ohio. This new flooring, it is claimed, will render a serviceable life equal to the plant structure itself. Applied on location it combines a heavy steel mesh and special filler as a complete unit for surfacing floors subjected to extra-tough use. It is called "Steel-Rock" and a

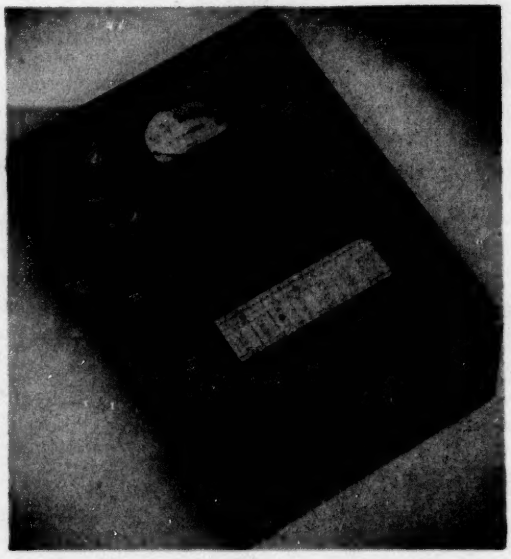
Steel Rock Applied on Warehouse Floor

study of its construction reveals how it withstands impact as well as heavy loads, and remains maintenance-free for many years. The resilient filler used in the grid compacts to meet the level of the steel ribs, thereby permitting wheels to ride on steel without the noise and slipperiness of solid surface. The product may be applied over new or old surfaces of wood or concrete, inside or out, at a depth varying from ⅜ inch to one inch, depending upon job requirements.

Thermistor-Type Temperature Indicator

SENSITIVITY and rapid response in temperature measurements are provided by the new Climate-Survey Temperature Indicators introduced by Beckman & Whitley, Inc., San Carlos, Calif. The basic instrument is available in three models: Model 196, six overlapping ranges spanning from minus 70 to plus 60 F; Model 197, six overlapping ranges spanning from 10 to 140 F; and Model 198, having a single range from 60 to 90 F. All are battery-operated for portability and provide 500 hours of continuous operation from a complement of batteries.

The sensing units, which consist of thermistor pairs in parallel, are hand-calibrated and a standardized re-



Thermistor-Type Temperature Indicator

placement service is available. Thermistors are selected for stability so that negligible instrument drift will be realized.

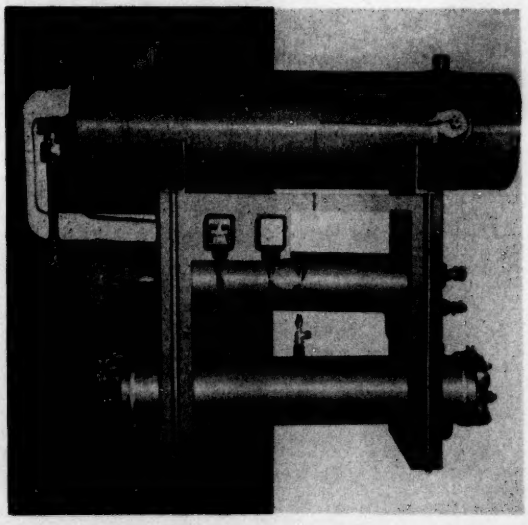
Each instrument is provided with two input receptacles and a selector switch so that reference-temperature or wet- and dry-bulb readings can be made. The instrument can be used with various sensing-element arrangements including aspirated shields, probes, aircraft wing-mounted shields, perforated shields, and Thornthwaite shields. Sensing elements can be located 800 feet from the instrument with standardized calibration, or with special calibration, cables as long as 8,000 feet can be used.

Direct-reading accuracy of all models is plus or minus 0.5 degree F through all ranges. Readings are made from a 3-inch square temperature-compensated meter at a response time of six seconds for 95 percent of steady state condition.

Housed in a wooden box with attached carrying handle, the temperature indicator instrument has dimensions of 4½ by 8 by 11 inches, and a weight, complete, of approximately 5 pounds.

Acme Announces New Packaged Units

THREE types of packaged units for air conditioning and refrigeration are now being produced by Acme Industries, Jackson, Mich., Acme first introduced the Flow-Cold Packaged Liquid Chiller in January 1950. It is a small, complete, compact unit for air conditioning and refrigeration in small industrial, commercial and residential applications. These units can cool water, handle coolant cooling for metal working, do mold cooling, chill liquid brines and provide air conditioned comfort for homes and offices. Requiring only simple electrical and plumbing connections to place it in operation, the new 1954 Flow-Cold has been redesigned to make it easier-to-install, easier-to-maintain and more efficient. The Flow-Cold Chiller is available in 6 models ranging



Acme Flow-Therm Packaged Water Chiller

in capacity from 2 through 15 tons.

Another packaged series is the redesigned Acme Flow-Temp Heat Pump which provides year round heating and cooling in all climates, for any type installation and under any conditions. This comes in six models that can deliver from 26,000 to 252,000 Btu. hr.

Beyond the size range of the Flow-Cold and Flow-Temp units Acme announces a complete new line of packaged units in larger sizes, the Flow-Therm Packaged Water Chiller. Designed to allow the user to tailor the unit to his exact job requirements but retaining the advantages of the factory package, the Flow-Therm gives the additional benefits of minimum erection and installation expense. Since the unit is shipped from the factory without compressor the user has the additional advantage of using the compressor of his choice. It is adaptable for heat pump use on larger installations. Capacities of the Flow-Therm range from 15 to 220 tons.

When it's a question of new refrigeration coils, it's no time to speculate on dependability or to compromise on quality. And where it's a question of assuring efficient, uninterrupted operation and low maintenance throughout the years —

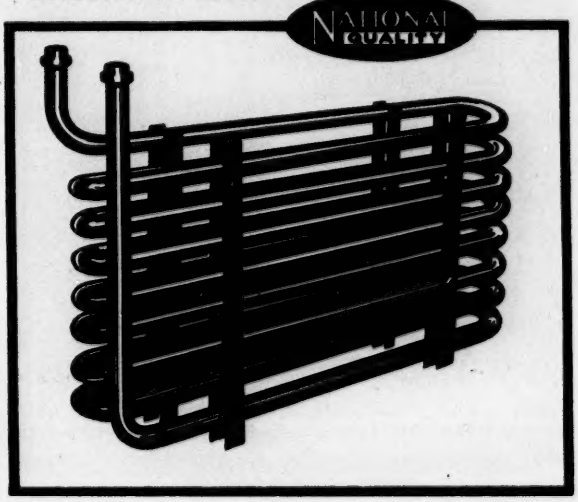
NATIONAL
REFRIGERATION COILS

offer you the benefits of over 70 years' specialization in the pipe-bending field: experienced engineering and exact production, with smooth bends, perfect welds, and accurate measurements.

Whenever you need coils, write for our free tracing-chart which shows standard dimensions ready to fill in. It will simplify your specifications—whether for zig-zag or nested box or conical or round-flat or reducing coils.

NATIONAL PIPE BENDING COMPANY
162 RIVER STREET • NEW HAVEN, CONN.

Established 1883



New Equipment—Continued

Machine Drills Concrete Floors

THE Mole, a machine for drilling large holes in concrete and masonry has been developed by Molco Drilling Machines, Inc., Washington, D. C. Use of this machine, it is claimed, is the most economical method of drilling holes up to six inches in diameter for running service lines through floors for piping and plumbing lines.

The "Mole" drilling machine in operation.

Reinforcing bars or hard aggregate are no obstacle to the machine. To use, the machine is placed over the desired spot, cutting compound and water placed in the cup, the motor turned on, and the drill operates. Holes may be drilled at any horizontal surface.

The machine is available in three models, with capacities of ½ to 3 inch diameter, a second ½ to 4 inches and a third ½ to 6 inches. They will drill up to 18 inches deep.

Time Switch

A NEW line of time switches for controlling multiple "on - off" cycles of less than one hour has been introduced by International Register Company, Chicago. Known as the Series T670 time switches, they are recommended for controlling heat defrosting of commercial refrigeration where defrost periods of one hour or less are desired.

Series T-670 Time Switch

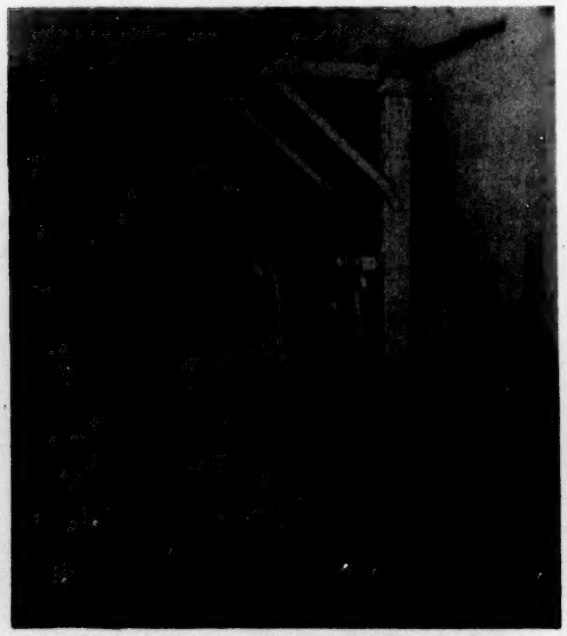
The Series T670 are the first time switches to permit 1 to 12 defrost cycles a day, with each cycle independently controlled. Each cycle can be adjusted individually for any time period ranging from 5 to 60 minutes. Changes in the length of the time period are accomplished by resetting the trippers. The T670 tripper is unique in that it has a small time scale stamped on the face of the tripper. There is also a time selector pointer which is held in place by a small screw. To change the length of the time period, simply loosen the screw, move the pointer to the desired timing and retighten the screw.

Heated Suits for Fork Truck Operators

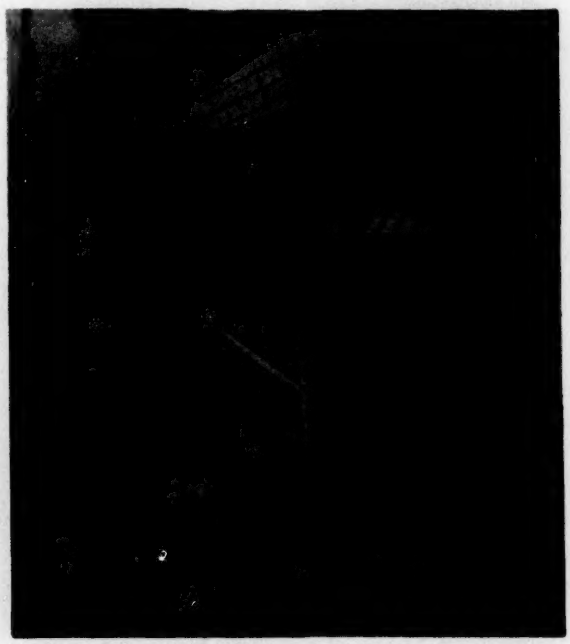
USERS of battery-powered material handling equipment operated in low temperatures will be interested in a new idea, reported by engineers of Gould-National Batteries, Inc., to increase truck productivity.

"Space suits", electrically heated by current taken from battery-powered fork-lift trucks, enable truck operators at Modesto Refrigerating Company, Modesto, Calif. to work for long periods in cold storage rooms at temperatures of 15 F below zero and colder.

The "space suits" are far less bulky than heavily lined clothing worn previously and allow greatly freedom of movement. Suits are government surplus worn by crews of high flying aircraft. The suits take 100 watts at 24 volts. It is possible to plug in the coat, pants and shoes separately or as a unit.



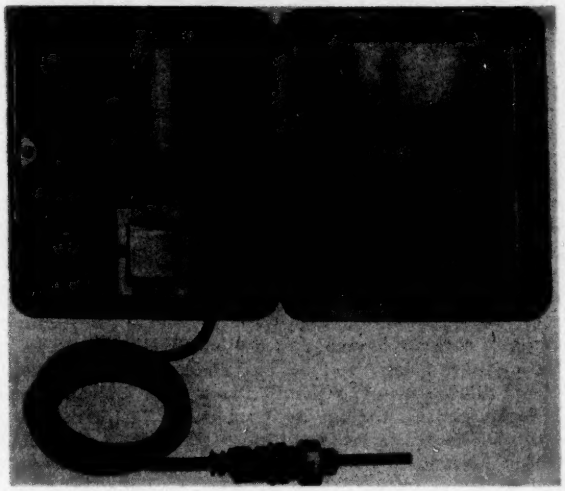
Truck operator connects "space suit" to storage battery in lift-truck before entering large refrigerated (-15) warehouse. Rheostat permits adjustment of temperature inside suit.



"Space suit," heated by current from storage battery in fork-lift trucks enables operator to work longer and more efficiently in temperatures 15 F below zero in refrigerated warehouses.

New Electronic Temperature Controller

A NEW two-zone electronic temperature controller announced by the Fielden Instrument Division, Robertshaw-Fulton Controls Company features high sensitivity, long term stability, reliability and low cost. The new unit is designed for a wide range of industrial applications in all industry where accurate temperature control is required. The Series 97 Electronic Temperature Controller uses a resistance temperature detector element as a sensing device in a bridge circuit in conjunction with a high gain phase sensitive amplifier relay unit. A single dial sets the temperature control point, and red and green lights indicate whether the temperature is above or below the set point. The single pole two-way control contact will handle 220 volts at 5 amps. Standard ranges are zero to 100, 300 or 500 Fahrenheit and Centigrade, but any range between the limits of minus 200 to plus 500 centigrade can be supplied in conjunction with an appropriate resistance bulb from the Fielden list. Sensitivity is 0.1F on all ranges. Only two vacuum tubes are employed and the unit is encased in a strong cast aluminum housing 6½" x 7½" x 4" deep.



Inside view, Fielden series 97 electronic temperature controller.

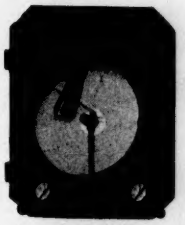
Tank Heating Selector

A NEW automatic sliding selector chart has been introduced by Tranter Mfg., Inc., Lansing, Michigan, which aids in calculating the number and type of Platecoils required in a tank installation. Platecoil is now used in many industries as a replacement for pipecoils. By knowing the size of tank in gallons or cubic feet, and the heating requirements one can quickly determine the number of Btu's and square feet of platecoil to do job efficiently and economically. Chart is handy C/D slide rule scale, constructed of 5-ply cardboard, coated for dirt and grease resistance.

Sliding Selector Chart Made by Tranter Mfg. Inc.

Taylor specializes in taking TEMPERATURES

WHETHER you want to control and record them, simply record them, or just have a clear, accurate indication of what they are, there's a Taylor instrument that will do the job superlatively well. Help you cut costs; give you new efficiency. Here are just a few of the wide selection. A postcard will bring you *Catalog 300*, with detailed information, or call your Taylor Field Engineer. Taylor Instrument Companies, Rochester, N. Y., and Toronto, Canada. *Instruments for indicating, recording and controlling temperature, pressure, flow, liquid level, speed, density, load and humidity.*



TAYLOR FULSCOPE® CONTROLLER

For *tanks, brine lines, compressors*, etc. Probably the most versatile instrument made for temperature, pressure, flow and liquid level control. Easily adaptable to any operating conditions.

TAYLOR RECORDING THERMOMETER

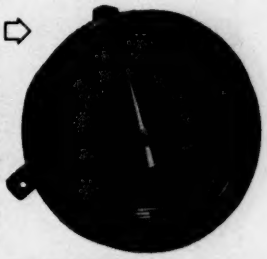
For *brine tanks, brine and ammonia lines, bunker rooms*, or any process in refrigeration where temperature record is required. Available to record in one, two or three different temperatures.

TAYLOR INDUSTRIAL THERMOMETER

For installation in insulated lines. Sturdy, one-piece, shallow case for wider angle of vision. Triple lens BINOC® tubing and bold, contrasting scale make this the easiest to read of all industrial thermometers. Straight or 90° angle stems. Many other types, ranges and angles.

NEW 6" DIAL INDICATOR

For temperature or pressure applications, where periodic reference only is required. Mercury, gas, organic liquid or vapor actuation, as desired. Variety of ranges. All new movement minimizes linkage error—gives greater accuracy throughout span. Fume and moisture proof case can be face or flush mounted.



®Reg. U. S. Pat. Off.

Taylor Instruments
MEAN ACCURACY FIRST

THERMOBANK
FOR
Ammonia
by KRAMER
THERMOBANK
the defrosting system that makes Ammonia SHINE!
LUCERNE MILK COMPANY, of Los Angeles, Calif., modernized with KRAMER AMMONIA THERMOBANK automatic defrosting system to end years of expensive manual defrosting.

"BEFORE" photo shows iced condition of the old overhead coils.

"AFTER" photo, same room, modernized with KRAMER Ammonia THERMOBANK at minus 25° F; 6400 gallons hardened daily.

INSTALLED BY ASSOCIATED REFRIGERATING ENGINEERS, LOS ANGELES, CALIFORNIA.

WRITE NOW FOR BULLETIN TA-182

KRAMER TRENTON CO.
Trenton 5, N.J.

PRESS BRIEFS

Brazil Plans To Build Food Storage Plants

AN opportunity reportedly exists for United States firms to participate in a program for construction of storage facilities for agricultural products in Brazil. Such facilities are urgently needed to handle the growing food production and improve marketing and distribution.

According to an official announcement, 300 million cruzerios are now available to the Brazilian Ministry of Agriculture for construction of warehouses and elevators. Allocation of these funds was approved in December 1953 under law No. 1506 of December 1951, which authorized expenditures for this purpose up to 400 million cruzerios.

The Ministry of Agriculture expects to enter agreements with the State Secretariats of Agriculture enabling joint Federal-State construction with funds contributed by both entities. Cooperating States are Rio Grande do Sul, Santa Catarina, Parana, Sau Paulo, Rio de Janerio, Minas Gerais, Espirito Santo, Bahia, and Goias. Some refrigerated installations are scheduled for perishable crops and livestock products.

The Ministry's plan includes, but is not limited to, the project approved by the Brazil-U. S. Joint Economic Development Commission proposing a dollar credit to help finance grain elevator construction in the State of Rio Grande do Sul. The latter is essentially a State project, whereas the cooperative Federal-State plan is broader in scope.

New Beef Packing Plant

THE Star Beef Company is putting up a building on Railroad Street, Bangor Maine, which with the land will cost about $250,000. The new building will be one of the most modern beef houses in New England. It will be 200 feet long and approximately 120 feet wide and two stories high, constructed of cement and block and is expected to be completed in June.

It will have capacity for 25 carloads of meat at a time and there will be four bays where trucks can back in for loading. It will be equipped with the very latest in freezer storage and refrigeration.

In addition to the truck loading space there will be a huge loading platform and space for parking cars and trucks. The property includes trackage which will greatly facilitate the unloading of meat. The building will have 11,000 square feet of space.

Cold Storage Addition

THE Portland Ice and Cold Storage Company, Portland, Oregon, has completed a $50,000 addition to its cold storage plant at 1810 N.W. 18th Avenue. The new two-story concrete building contains 36,000 cubic feet of freezer space. The freezer rooms are insulated with heavy cork and fiberglas and are equipped with the latest modern cold diffuser blower for quick freezing of foods. The machines are equipped with automatic temperature and humidity controls.

Some of the older machinery in the existing plant also is being replaced with high speed automatic compression equipment. A new concrete loading dock has been added for more rapid handling of rail and truck shipments. To make room for the new addition it was necessary to demolish an old structure which housed the oldest refrigeration operation in the city, dating back to 1882.

Utah - Montana Merger

THE operation of the Utah Ice & Storage Company and the Montana Ice and Storage Company was taken over by the Properties Management Corporation, a subsidiary of Southeastern Public Service Company, January 1, 1954. The Southeastern Public Service Company operates the Royal Palm Ice Company in Florida, Railways Ice & Service Company in seven midwestern and western states, the Southern Texas Ice & Service, Inc., the Albuquerque Ice Company and Grants Ice Company of Grants, New Mexico.

C. J. Gregory, president of Southeastern, has announced that the headquarters of the Utah Ice & Storage Company will be in Salt Lake City under the direction of N. F. Hecker, and the Montana Ice and Storage Company will have headquarters in Butte, Montana, under the direction of Clifford Hirsh. Mr. Gregory stated that Southeastern welcomes the opportunity of serving the ice and storage users in the Colorado, Utah and Montana areas.

These new properties include the plant at Boulder, Colorado, three ice and cold storage plants in Salt Lake City, and a creamery, ice and cold storage plant in Butte, Montana.

Ebner Ice Plants Sold

PROPERTIES of The Ebner Ice and Cold Storage Company, with main offices at Vincennes, Indiana, were sold at public auction in a bankruptcy sale in Vincennes, January 28. The real estate in Vincennes, which includes the Ebner Building, was sold to the Becker Motor Company of Detroit, Mich., for $24,500. The personal property was purchased by William Dunes for $8,250.

The ice plant at Olney, Ill., was sold to James M. Hunley, co-owner of the B & B Readi-Mix Concrete, which is located just north of the newly acquired property. He had not yet decided regarding the operation or disposition of the plant.

The Martinsville, Ind. properly was sold to A. D. Kahrern of Martinsville for $17,500.

The high bid for the Seymour, Ind. plant of $10,000 was submitted by the City Ice and Fuel Company of Indianapolis.

The Farmers Co-op Stock Yards of Washington submitted the high bid of $12,750 for the Washington, Ind. property.

A high bid of $8,750 was submitted by Lee Brown of Flora for the Flora, Ill. plant.

The Mt. Carmel, Ill. plant was sold to the Henneberger Ice Company of Mt. Carmel for $900.

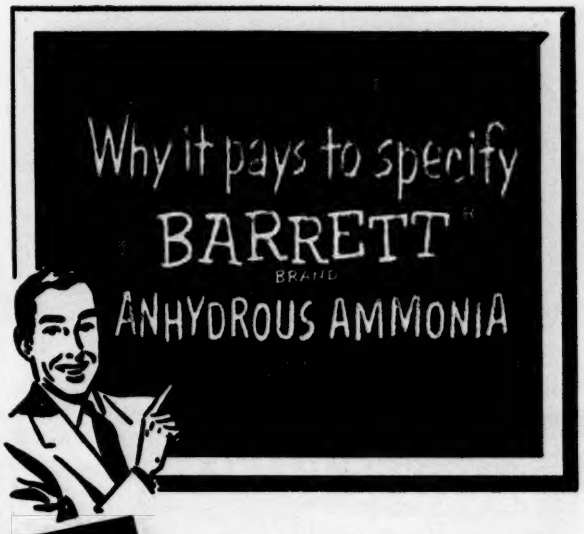
The personal property at the Vandalia, Ill. plant was sold to the Ford Roofing Products Company for $2,500.

Refrigeration in Russia

RUSSIAN consumers now have a 50-50 chance of finding their food protected by refrigeration when they walk into nationally-operated food stores and restaurants.

The official newspaper Pravda announced that "54 percent of the State Trade Organization's stores dealing in perishable goods and 50 percent of the public catering enterprises (lunchrooms) had refrigeration units in 1953." This is said to be seven times the number of refrigeration units operating in such establishments in 1949 and 12.5 times the number operating in 1940.

As late as 1949, Pravda admitted, only five percent of all State Trade Organization food stores and lunchrooms had refrigeration facilities. Pravda also claimed that refrigerated warehouse capacity has doubled since 1940.



ECONOMY

It is the most economical and efficient type of refrigerant in use today.

PURE AND DRY

Barrett® Brand Anhydrous Ammonia is famous for consistent purity and uniform dryness. No other brand of anhydrous ammonia is purer or dryer.

FAST DELIVERY

Barrett Brand Anhydrous Ammonia is stocked coast-to-coast in 150, 100 and 50-pound cylinders. An adequate supply of cylinders in all sizes helps assure fast delivery in the size you want.

TROUBLE FREE USE

Every cylinder valve is carefully inspected before it leaves the plant. This assures you of properly working valves and trouble-free use when cylinders reach you.

FREE TECHNICAL HELP

Technicians specially trained in the use of Anhydrous Ammonia cylinders stand ready to help you at all times without cost or obligation. Write for free booklet, "Guide for the Use of Barrett® Brand Anhydrous Ammonia in Cylinders."

For greater savings, better service and better performance, specify Barrett® Brand Anhydrous Ammonia—the brand with the bright green cylinder caps.

NITROGEN DIVISION ALLIED CHEMICAL

Nitrogen Division

ALLIED CHEMICAL & DYE CORPORATION

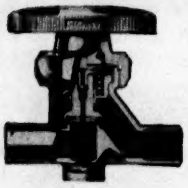
40 Rector Street, New York 6, N. Y.

FIRST IN AMMONIA SINCE 1890

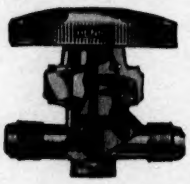
HENRY LINE VALVES really give you something extra

They give more dependable service because of advanced field-proven design and construction as well as patented features.

PACKLESS VALVES
FOR FREON
with Exclusive Balanced-Action

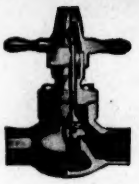


STANDARD TYPE
Ball check in balancing channel permits diaphragm inspection and replacement with valves under line pressure. Sizes, ¼" thru ⅝" flare; ¼" thru 1⅜" O.D. Solder, ¼" thru ½" F.P.T.

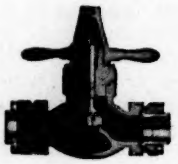


BLUE BANTAM TYPE
Same as standard Balanced-Action valve except that diaphragms cannot be inspected or replaced under line pressure. Size ¼" thru ⅝" flare and O.D. Solder.

PACKED VALVES
FOR FREON
Bronze-Wing Cap Type



Globe and angle types with solder connections, bolted bonnets, sizes ⅞" thru 5⅛" O.D.



SEMI-STEEL WING CAP TYPE
With bolted bonnets and square companion flanges. Furnished with brass tailpieces (O.D. Solder) 1⅜" thru 5⅛" or with steel tailpieces for welding to pipe, sizes 1¼" thru 5".

Also Globe and angle types with F.P.T. connections, sizes ½" thru 2".

PACKED VALVES
FOR AMMONIA
Permanent-Mold Iron and Semi-Steel

Compact and strong with self-aligning stem disc. Sizes (F.P.T.), screw bonnet: ¼" thru 1", bolted bonnet 1¼" thru 2"—with flange connections 1¼" thru 5".

HENRY—Standard equipment by leading Manufacturers, Army, Navy, Coast Guard and Maritime Commission • Stocked by Leading Jobbers

WRITE FOR CATALOGS

HENRY VALVE CO.

HENRY VALVE CO. CONTROLLING FLOW SINCE 1914

Valves—Driers—Strainers—Control Devices and Accessories for Refrigeration, Air Conditioning and Industrial Applications

MELROSE PARK, ILL. (CHICAGO SUBURB)
CABLE: HEVALCO, MELROSE PARK, ILLINOIS

In the Spotlight

REFRIGERATION has an essential part in the manufacture of chemicals from natural gas in a new plant constructed for that purpose at Tuscola, Illinois. This unique plant, with special reference to the refrigerating process utilized, is described and illustrated in the article starting on page 15.

CORROSION CONTROL is of vital importance to American industry because of the costs resulting from lost production time, equipment repairs and replacements. Information now available makes it possible to hold it under control. Practical suggestions for accomplishing this are given in the article on Control and Prevention of Corrosion, starting on page 20.

A NEW one-story freezer-storage warehouse with 350,000 cubic feet was erected by The California Consumers Corp. in Los Angeles, Calif., in 100 days. The story of preliminary surveys and methods used to speed up construction because of immediate need of the new facilities are told in the article starting on page 27.

HANDLING OPERATIONS are speeded up in the new freezer storage annex of Produce Terminal Warehouse, Chicago. Although of two-story construction it retains all the modern handling methods and conveniences of a one-story operation, with complete mechanized handling equipment throughout. For details and pictures see article starting on page 23.

FREAK temperature in Chicago caused a girdle of frost and ice on exterior wall of a cold storage warehouse. See illustrated article on page 40.

FROZEN FOOD Packers held their annual convention in New York January 31-February 3. Increased sales and decreased prices were reported. Increased production with resulting surpluses and price cutting was one of the serious business problems discussed. For additional details see summary of report starting on page 36.

RESERVATIONS for the AWA - NARW - TRRF Conventions to be held at Boca Raton, Fla. April 25-29 indicate that a record attendance will be present. For preliminary details of the program and other activities, see page 40.

HOLDINGS of cold storage commodities on January 31 was 50 percent for coolers and 77 percent for freezers, about equal to the five-year average occupancy for January, but less than reported last year. For additional details of this monthly report see page 42.

REVISIONS of The American Standard Safety Code for Mechanical Refrigeration have been approved by The ASRE and The American Standards Association. These revisions are listed in article on page 46.

CENTRIFUGAL ammonia compressors are being installed in oil refining plants for the process of dewaxing. One of the latest such installations is in the Nippon Petroleum Refinery, Yokohama, Japan. See page 19.

EACH YEAR, more than two million people reach the age of 18, and approximately one and a half million marriages take place. This constant turnover of consumers alone, warrants constant advertising.

ICE VENDING is plugged and at the same time humorous words of wisdom about vending are offered in The Reader's Digest for February. "At an ice plant in a western town, there are a number of slots which dispense ice of various sizes and kinds. Directions are printed over each slot and in the center is a sign "When All Else Fails, Try Reading Directions."

THE FROZEN FOODS industry at the start of 1954 appeared to be compounded of two favorable and one unfavorable developments. On the plus side were increasing consumer acceptance. On the minus side was serious price cutting among some of the packers.

PROFITS of incorporated business have increased by $12,000,000,000 from 1939 through 1952, while in the same period, wages and salaries paid to employees increased by 152 billion dollars.

SUPERMARKETS sell 16 percent of the nation's retail ice cream according to a survey of 164 companies operating 2,395 outlets. Ice cream sales in these supermarkets account for 1.37 percent of the store sales or about $200,000,000 a year.

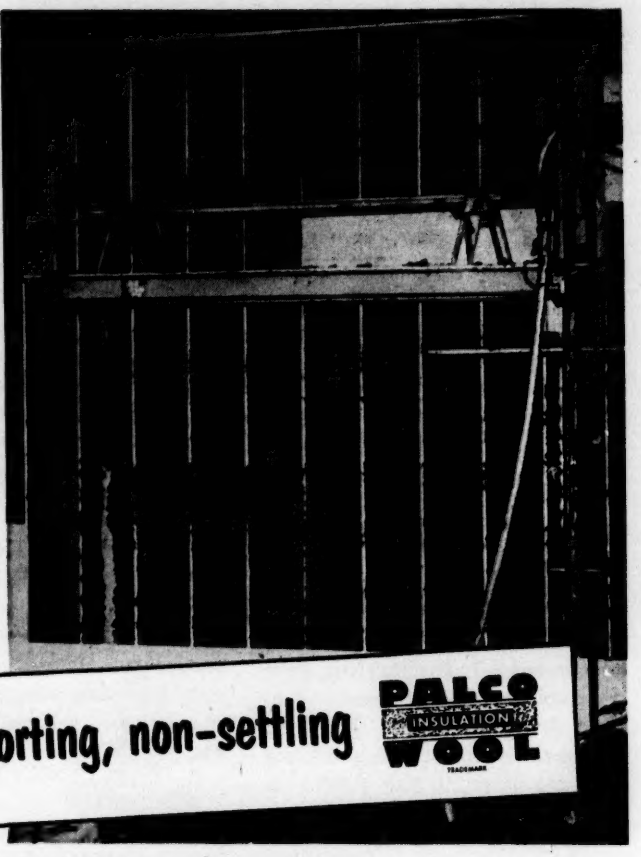
Can You Use a Friend?

WHAT do your local high school science teachers do in the summer? Are they making full use of their training and experience? Would it be good public relations to have them view the problems, needs, and accomplishments of your company at first hand?

Why not invite your local science teachers to apply for a summer job? Spot them where they can see science in action. Let them see the kinds of skills and abilities your new employees need. Let them become acquainted with the new instruments, processes, and practices that you have introduced since these people received their college training. If you can use teachers from outside your local community get in touch with the Future Scientists of America Foundation, the National Science Teachers Association, 1201 16th St. NW, Washington 6, D. C.

In planning or estimating low temperature insulation . . .

INVESTIGATE THIS NEW VOID-FREE METHOD

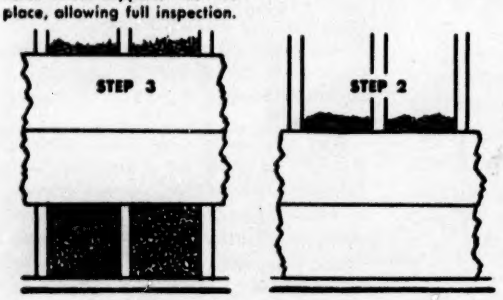


. . . of installing self-supporting, non-settling PALCO INSULATION WOOL

STEP 1 Install 2" x 4" or 2" x 6" studs. Spot-nail temporary sheet of 2' x 8' plywood to studs. Pack Palco Wool between and behind studs to top of sheet. Add second temporary sheet and repeat

STEP 2 Remove bottom sheet and place above second sheet. As wall area is filled to top of each sheet, lower sheet is moved to top and hand-packed filling process continues.

STEP 3 When wall area is packed solid to ceiling, remove temporary sheets Resilient Palco Wool supports itself in place, allowing full inspection.



PERMITS FULL VISUAL INSPECTION OF INSULATION IN PLACE

High insulation efficiency for enduring low temperature control depends on fully packed, self-sustaining, void-free application. Under the new Palco method, Palco Wool can now be installed quickly at low cost, allowing complete wall height inspection before interior lining is applied. The permanent resilience of Palco Wool insures fully self-supporting, non-settling installation.

Areas are filled and packed to proper density. Once in place, Palco Wool stays put with no settlement as long as the structure stands. Investigate today the Palco void-free method of installation. Adopt Palco Wool for lasting efficiency.

Palco Board Insulation

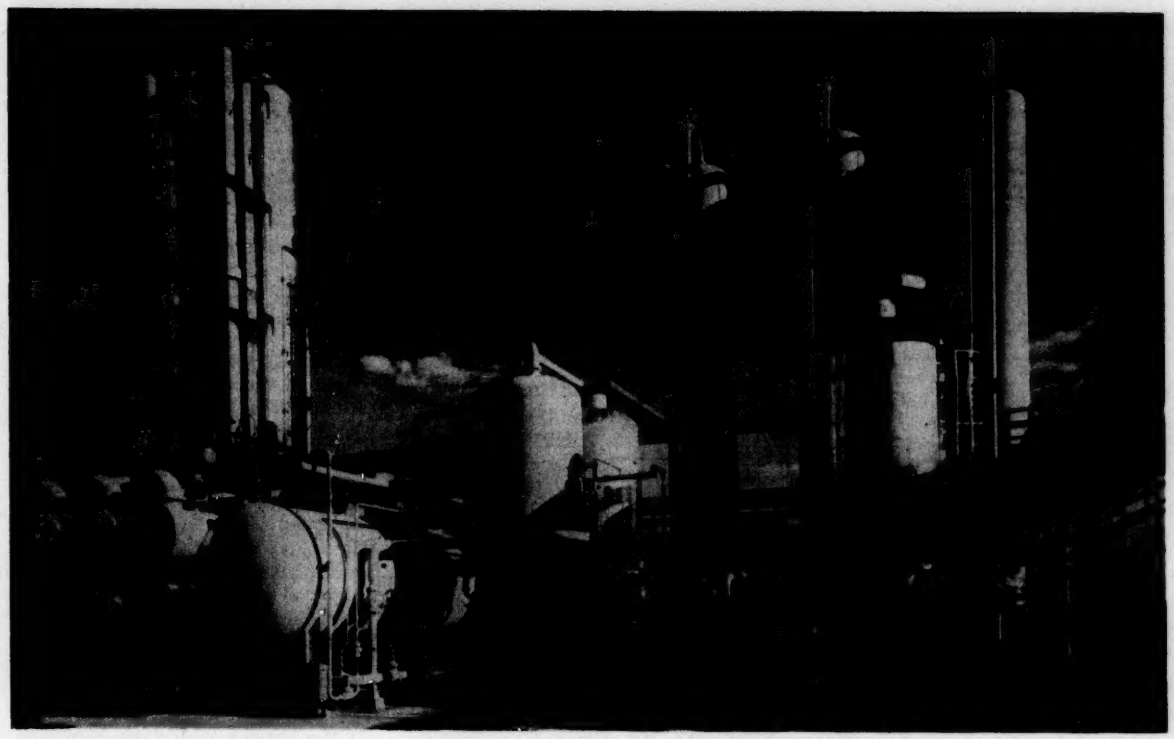
A companion product to Palco Wool — ideally suited for floors, walls, roofs and self-sustaining partitions . . . offers high compressive and transverse strength. Investigate Palco Board, today.

PALCO INSULATION WOOL

PALCO INSULATION BOARD

THE PACIFIC LUMBER COMPANY

100 BUSH STREET, SAN FRANCISCO, CALIFORNIA
35 EAST WACKER DRIVE, CHICAGO, ILLINOIS



Three 2425-ton propane refrigeration compressors, housed in the building at the far left, provide refrigeration for the extraction unit in National Petro-Chemicals Plant, Tuscola, Illinois. To the right of the building are the six condensers, the surge drum and the vertical flash tanks.

10,000 Ton Refrigeration Plant Used To Manufacture Chemicals

Extracting Chemicals from 400 million cubic feet of natural gas daily requires 10,000 tons of refrigeration

W. F. STOECKER

Refrigeration has an important part in the process of manufacturing chemicals from natural gas in the National Petro-Chemicals Corporation plant at Tuscola, Illinois. From 400 million cubic feet of gas which pours into the plant each day, pentane, butane, propane and ethane are extracted, and from these other industrial products are extracted. This article presents an unusually detailed description of the use of refrigeration in this plant.

WHEN the 50 million dollar plant of National Petro-Chemicals Corporation began operating last summer, ten thousand tons of refrigeration went into service. Centrifugal compressors are used in the refrigeration systems in this plant in Tuscola, Illinois, which manufactures chemicals from natural gas.

Refrigeration is essential to the plant operations. Each day, 400 million cubic feet of gas pour into the plant. After extracting pentane, butane, propane and ethane, National returns the remaining 93 percent to the pipeline. From the extracted gas, the plant removes the pentane, butane and propane, and, without further processing, ships them by rail or truck. The ethane, at high temperature and pressure, breaks down into ethylene, which feeds the units of the plant making ethyl chloride and ethyl alcohol.

Tuscola was a natural site for the plant, since two Panhandle Eastern gas lines join there. One line comes from Kansas, the other from the Gulf Coast. Formed in 1951, National Petro-Chemicals Corporation is a partnership of National Distillers Corporation and Panhandle Eastern Pipeline Company.

The new plant will supply 30 percent of the nation's synthetic alcohol, which is used in hundreds of products, including synthetic rubber, explosives and photographic film. Ethyl chloride is one of the ingredients used in making tetraethyl lead, the knock inhibitor in gasoline.

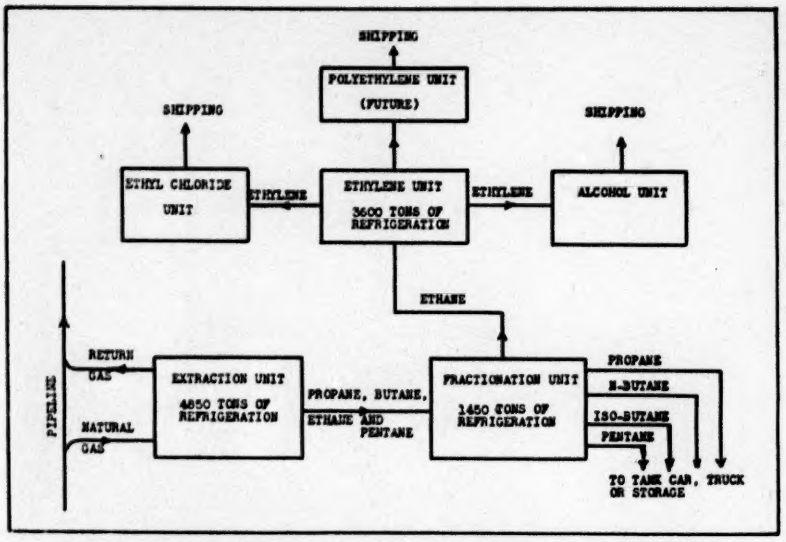


Fig. 1—Layout of National Petro Chemicals Plant, Tuscola, Illinois.

Arrangement of Plant

Fig. 1 shows where the plant uses refrigeration. Natural gas from the pipeline flows to the extraction unit, which removes all of the hydrocarbons used subsequently in the plant. A refrigeration system, with a capacity of 4850 tons, chills an absorber to minus 20 F to absorb the hydrocarbons.

From the extraction unit, the mixture of pentane, butane, propane and ethane goes to the fractionation unit, which separates the gases. To condense the ethane vapor, 1450 tons of refrigeration are required. Tank cars or trucks haul the propane, pentane and butane away, or these gases are stored either above or below ground.

The ethane from the fractionation unit passes to the ethylene unit. Here the ethane at high temperature and pressure cracks down into ethylene, hydrogen and other hydrocarbons. Thirty-six hundred tons of refrigeration pull the temperature of absorbing and fractionating towers down to sub-zero temperatures to purify the ethylene.

The largest single unit of its kind in the world, the ethylene unit will produce 300 tons each day. The ethylene unit feeds the ethyl alcohol unit, which produces 125,000 gallons of 192 proof alcohol a day, and the ethyl chloride unit, which turns out 70 tons a day.

Refrigeration Systems

Steam turbines drive the centrifugal compressors, which pump the propane refrigerant through the systems. The refrigeration systems in the extraction and fractionation units operate on the same basic cycle shown in Fig. 2. High pressure propane from the compressor liquefies in the condenser and collects in the surge tank until needed. Float valves, controlling the liquid level in the flash chambers, serve as expansion valves to reduce the pressure of the propane in several steps. The flash gas from the high and medium pressure flash chambers enters intermediate stages of the compressor. Liquid propane from the low pressure flash chamber evaporates in the shell of a heat exchanger and removes heat from the fluid which passes through the tubes of the exchanger.

Because the plant can't operate without refrigeration, standby compressors are necessary. In the extraction and ethylene units, where condensing steam turbines are used, the steam condensers are kept under vacuum at all times; thus, the standby compressor can come on the line within ten minutes.

Refrigeration in Extraction Unit

Natural gas from the pipeline comes to the extraction unit, shown schematically in Fig. 3, where moisture is first removed. After a chilling in a heat exchanger, the gas enters an absorbing tower where an oil absorbs the butane, pentane, propane and ethane in the natural gas. The colder the oil, the more liquefied the petroleum gases it will absorb, so the oil is refrigerated to minus 20 F. When the oil absorbs gas, it warms up. To keep the oil cold, the oil flows out of the absorber and through propane evaporators several times on its way down the absorbing tower. By the time it leaves the absorbing tower, the oil is rich in liquefied petroleum gases. In the oil heater, the addition of heat drives off the gases from the oil. The mixture of butane, pentane, propane and ethane thus liberated goes on its way to the fractionation unit.

After the gases are removed from the absorbing oil, the oil must be chilled before it is sent back into

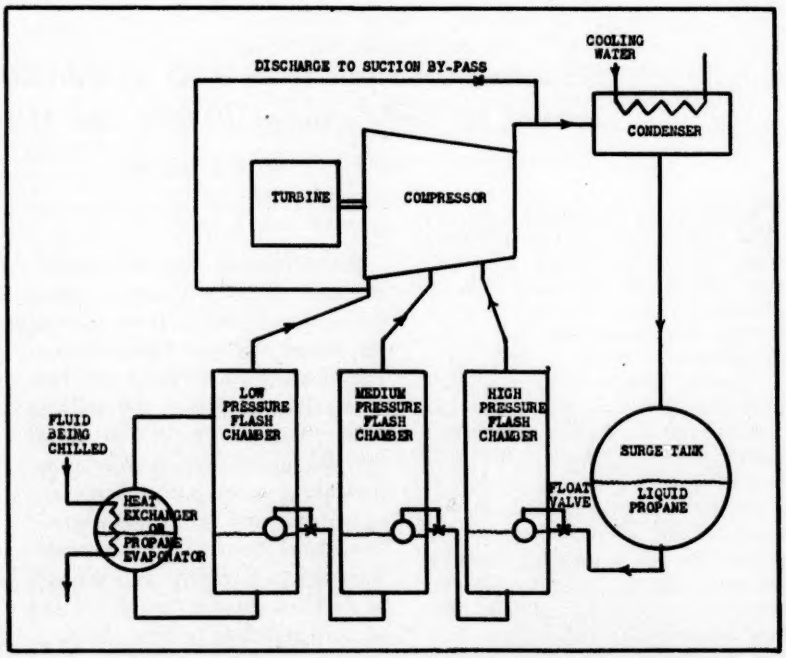


Fig. 2—Propane refrigeration cycle, National Petro-Chemicals Plant.

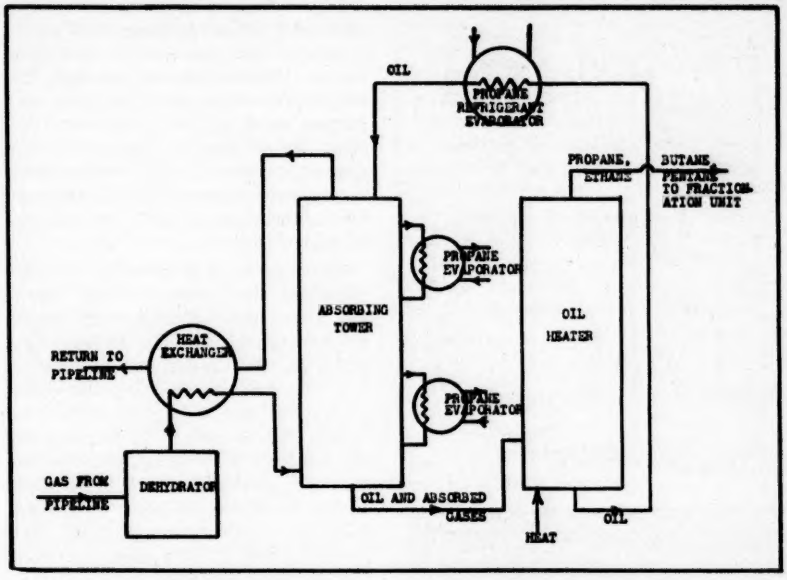


Fig. 3—Extraction unit, National Petro-Chemicals Plant.

the absorber. The natural gas coming out of the absorber cools the incoming gas in the heat exchanger and then returns to the pipeline.

Two compressors, operating in parallel, carry the refrigeration load, and one compressor is used for standby service. Condensing turbines of 4400-hp capacities drive each of the 2425-ton compressors. The rated speed of the units is 6750 rpm. Steam comes into the turbine at 600 psia and 715 F and leaves at a pressure of from 24 to 30 inches of mercury, vacuum.

Refrigeration in Fractionation Unit

From the extraction unit, the liquefied petroleum gases flow to the fractionation unit, which separates the butane, propane and pentane from the ethane. Fig. 4 is a schematic flow diagram of the fractionation unit. The gases from the extraction unit pass through a preheater and then enter the de-ethanizer tower, where the ethane separates from the other gases. The ethane vapor leaves at the top of the tower and flows to the propane refrigerant evaporator. The propane, at 30 F, condenses the ethane. Some of the ethane vapor by-passes the ethane condenser and separates from the liquid in the surge drum. The ethane vapor travels on to the ethylene unit, while the liquid ethane returns to the de-ethanizer. Liquid ethane, returning to the de-ethanizer, washes down any butane or propane gas which may be rising to the top of the de-ethanizer.

The colder the liquid ethane returned to the de-ethanizer, the purer will be the ethane vapor leaving the top of the de-ethanizer. A colder ethane temperature requires more refrigeration, however, so the specified purity of ethane vapor determines the temperature of the liquid ethane. This temperature is controlled by the amount of ethane gas that by-passes the ethane condenser.

A 1400-ton centrifugal compressor supplies the compressor capacity, and an identical unit provides standby service. The 1725-hp steam turbine uses 600 psia inlet steam and exhausts to a pressure of 65 psia. Exhaust steam supplies heat for the preheater and the boiler at the bottom of the de-ethanizer.

Refrigeration in Ethylene Unit

The ethylene unit requires two levels of refrigeration: minus 30 F and 25 F. After the ethane coming from the fractionation unit is cracked, the result is a mixture of ethane, ethylene, hydrogen and methane. The temperature of the mixture drops to 0 F when the stream passes successively through high and low temperature propane evaporators. Entering the absorber at 0 F, the mixture separates: the ethane and ethylene leave as liquids, and the methane and hydrogen pass out the top of the tower as gases. To keep the absorber cold, high and low temperature propane evaporators chill liquid that is drawn out and then returned to the absorber. Refrigeration is also used to separate ethane from the ethylene and to condense the ethylene thus separated.

Fig. 5 shows the unique control arrangement in the refrigeration system. Each of the flash chambers serve a number of evaporators. The low temperature evaporators operate at a pressure of 15 psia, the high pressure evaporators at 60 psia. Gas from the low pressure evaporators enters the first stage of the compressor. To keep the pressure at 15 psia, a suction pressure control regulates the speed of the compressor by adjusting the steam flow to the turbine.

Suction gas from the 60 psia evaporators enters an intermediate stage of the compressor. The stage pressure does not remain constant as the compressor speed changes, so a pressure regulating valve throttles the gas between the high pressure evaporators and the compressor to

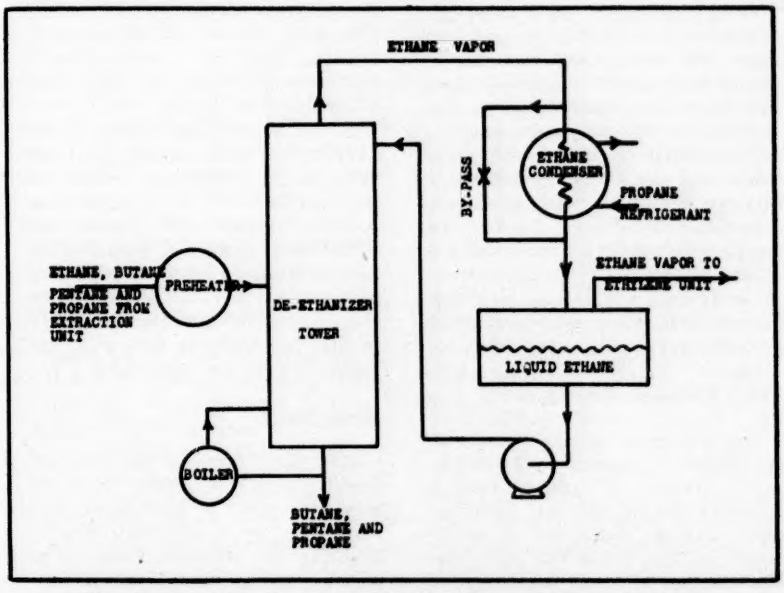


Fig. 4—Fractionation unit, National Petro-Chemicals Plant.

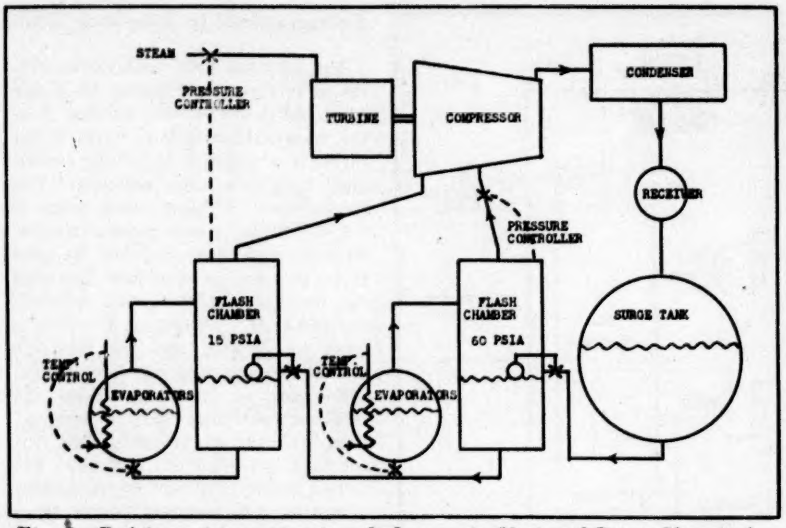


Fig. 5—Refrigeration system in ethylene unit, National Petro-Chemicals Plant.

maintain 60 psia in the evaporators.

Because liquid propane is available at the evaporators at a fixed temperature, the temperature of the ethane or ethylene being cooled would fluctuate as their rates of flow changed were some method of temperature control not provided. The temperature of the ethane or ethylene stream leaving the propane evaporator, therefore, regulates the level of liquid propane in the evaporator. When the temperature of the ethane or ethylene stream rises above the desired point, the controller opens the propane inlet valve and raises the level of liquid propane in the evaporator. The higher level increases the heat transfer and pulls down the temperature to the control point.

Faulty operation could cause the temperature controller to call for more and more liquid and still be unsatisfied. Liquid would then flood into the suction line. To prevent this, a high-level control on the evaporator over-rides the temperature controller and cuts off the flow of liquid propane when the level gets too high.

In the ethylene unit, two 1800-ton compressors carry the load and another compressor serves as a standby. A 2350-hp condensing steam turbine is the prime mover for each compressor.

Why Propane Refrigerant?

Low cost is the primary reason for the choice of propane as the refrigerant. Systems as large as those in National Petro-Chemicals' plant require sizeable quantities of refrigerant. In the extraction and fractionation units alone, the charge is 20,000 gallons. Since propane is one of its products, the plant can supply the initial charge as well as make-up refrigerant inexpensively.

Oil Purging

Some lubricating oil and other heavy fractions of oil in the propane collect in the evaporators. As a part of their regular work, the operators purge the evaporators of oil. Some propane comes along with the oil during purging, and although part of the propane can be reclaimed, some of it is lost. Make-up refrigerant must be added to replace the loss.

Cooling Water

All cooling water for the condensers comes from cooling towers. Pumps draw make-up water from a man-made lake of 100 million gallon capacity. This lake is fed from a small nearby river or from wells when the river is dry.

In the refrigeration system of the extraction unit, 22,430 gpm pass through the condensers, which are designed for 83 F inlet water temperature and 89 F outlet water. Some of the condenser water goes to other heat exchangers before it returns to the cooling tower, but the refrigeration condensers get the water first so that the water is cold and least likely to foul the condensers.

Blow-Back

Blow-back through the compressors has damaged several compressors at the plant. If the turbine steam valve trips, as it does when the lubricating oil pressure drops to an unsafe point or the discharge temperature of the propane rises too high, the turbine instantly withdraws its torque from the compressor shaft. The high pressure gas in the condenser then backs up through the compressor. This gas drives the compressor as a turbine and turns the shaft in a direction opposite from normal rotation. Within five seconds, the rotation changes from 6,000 rpm in one direction to 3,000 rpm in the other.

When blow-back occurred in one machine, the severe stresses threw the shaft out of alignment badly enough to damage the interstage seals, the diaphragm, the inlet vanes and the impeller. Running the compressor in the wrong direction reversed the direction of rotation of the lubricating oil pump, because the gear pump supplying the lubricating oil is connected to the compressor shaft. Instead of pumping oil, the pump sucked it. The bearings were ruined.

To guard against blow-back, butterfly valves in the discharge lines close when the turbine valve trips closed. Even though the butterfly valves can close within two seconds, they are not fast enough. Plant engineers intend to install check valves in the refrigerant discharge line and have already installed check valves in the lube oil line to guard against future damage.

Turbine Speed Control

Suction pressure of the propane refrigerant controls the turbine speed in the fractionation and ethylene units. When the refrigeration load drops off, the suction pressure decreases. The control then reduces the turbine speed, which cuts down the refrigerant flow.

In the extraction unit, a ring pressure control regulates the turbine speed. Here, the steam pressure in the casing just before the first stage wheel senses the load on the turbine. If the refrigeration load diminishes, the steam pressure drop through the governor valve decreases and the control mechanism reduces the flow of steam to the turbine.

The suction pressure method of control has been more satisfactory than the ring pressure control, because the fluctuations in ring pressure have been large enough to cause wide variations in speed.

Starting and Stopping Procedure

The starting procedure which has worked best is to open the suction line valves, open the discharge-to-suction by-pass line (shown in Fig. 2) and close the discharge valve. Af-

ter the compressor has come up to speed, the discharge valve is slowly opened and finally the discharge-to-suction line valve is closed.

If the suction valves are closed as the compressor comes up to speed, opening them allows gas to rush into the impellers and jolt the compressor. Also, after the first rush of gas is pumped out, the compressor starves because there is no refrigerant boiling in the flash tanks. The compressor will continue surging until operation becomes stable.

The critical speed of the extraction unit compressor is 4350 rpm, so operators push through that speed as quickly as possible when starting up. The critical speed of the small fractionation unit compressor is higher than the operating speed, so the critical speed is not encountered.

To shut down the refrigeration system, the discharge-to-suction by-pass is opened, the discharge valve closed and the turbine valve tripped. The compressor then coasts to a stop.

The Future

In three years, Tuscola has become one of the petro-chemical centers of the nation. Tied in with the National Petro-Chemicals plant is an adjacent sulfuric acid plant of United States Industrial Chemicals Company.

By 1955, National plans to have in operation a plant making polyethylene, the tough, flexible plastic used in squeeze bottles and as a substitute for rubber, metal and plastics. Steam ejector systems will provide the refrigeration for the polyethylene plant.

Plans also call for the construction of a 7 million dollar ammonia plant which will combine the hydrogen of National's plant with nitrogen produced by the refrigeration and liquefaction of air.

New Standard on Rating Air Conditioners

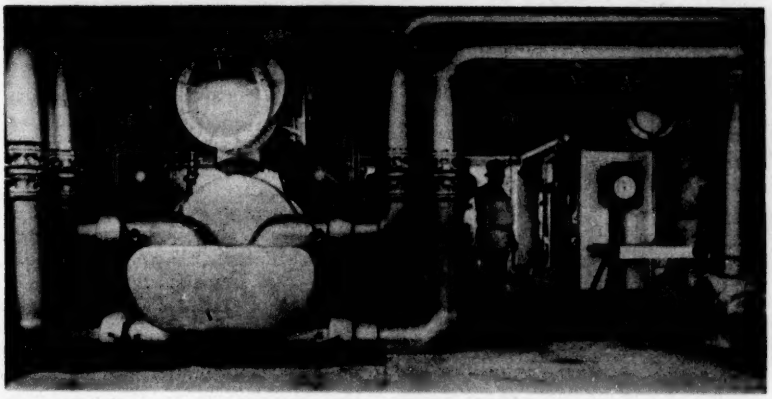
A STANDARD on Methods of Rating and Testing Air Conditioners has been issued by the American Society of Refrigerating Engineers bearing the number 16-53. This new Standard supersedes ASRE Standards 13, Standard Method of Rating and Testing Air Conditioning Equipment; 16, Standard Methods of Rating and Testing Self-Contained Air Conditioning Units for Comfort Cooling; and 16-R, ASRE Standard Methods of Rating and Testing Air Conditioners. It includes the cooling and the heating and other functions of self-contained air conditioners, room air conditioners, remote-type air conditioners, heat pumps and oil and gas fired air conditioners.

This latest revision affects primarily the room air conditioner portion of the Standard and is for the purpose of providing alternate testing methods in addition to the calibrated room specified in 16-R, which was a revision of Standards 13 and 16.

In general, the test apparatus described in this Standard is basically of the same type as described in the original Standards 13 and 16 except for the inclusion of the Calibrated Room Calorimeter, which is primarily intended for testing room air conditioners of the free-delivery type. Since this apparatus does not require attachments to air inlets or outlets, it avoids the possibility of influencing the ratings, as might be the case where such attachments are applied to certain types of room air conditioners.

This Standard may be obtained from the American Society of Refrigerating Engineers, 40 West 40th Street, New York 18, N. Y.

Japanese Refinery Installs Centrifugal Compressors for Dewaxing



Centrifugal compressor installed in plant of Warren Petroleum Corp., Breckenridge, Texas.

TWO big centrifugal ammonia compressors believed to be the first refrigeration application of this type ever installed abroad by an American company have been purchased for use in a Japanese oil refinery. The installation will be used in removing paraffin from lubricating oils, in a process called MEK dewaxing. It is the first known application of centrifugal ammonia compressors to this process. The compressor, supplied by Carrier Corp. will be installed at the Nippon Petroleum Refinery, Yokahama, Japan.

The Dewaxing Process

Dewaxing is a process employed in petroleum refining. The refrigeration equipment is used in the following manner: The oil solution which is high in wax content is chilled to a point where the wax crystallizes and is precipitated out as a solid. The oil in the original solution, less the wax, then continues through additional refining processes. All natural oils contain wax in various degrees.

Centrifugal Compressor Recent Innovation

Although direct compression of ammonia by reciprocating units is common, centrifugal compression is a recent innovation permitting considerably greater tonnages in proportion to the size and amount of equipment. Ammonia centrifugals were selected for this plant in preference to propane because of the increased efficiency of the former, and its greater availability in Japan. The decision was made following studies by the California Texas Oil Company, of which the Japanese firm is an associate, Arthur C. McKee and Company, the contractors, and Carrier. The compressors will operate between a suction pressure of 41 pounds and a discharge pressure of 218 pounds.

The two compressors will be driven by a 2,700 horsepower condensing turbine. The base refrigeration load will be approximately 1,250 tons with additional side loads carried by the compressors at intermediate stages.

Control and Prevention of Corrosion

The direct and hidden cost of corrosion in lost production time, along with equipment repairs or replacements is greater than maintenance costs. How to apply effective control.

L. R. HONNAKER
Engineering Department
E. I. DuPont de Nemours & Co.
Wilmington, Del.

IT IS generally agreed that the direct cost of corrosion to American industry is several billion dollars annually. An even greater sum of money may be involved in the hidden cost of corrosion if it is considered that in many instances the value of lost production time incidental with equipment repairs or replacements is greater than the maintenance costs. Today, manufacturing steps are highly integrated and techniques have largely changed from batch to continuous type operations. This means that practically none of the equipment can be out of service for repairs or replacement without seriously curtailing production. It is very important in these days of expensive materials and high construction costs that minimum facilities be installed to meet operating requirements. These conditions require careful consideration of corrosion and selection of materials of construction. Obviously then, corrosion control and prevention warrants serious attention by management and all others responsible for the building and maintenance of the plants.

The subject of corrosion control is vitally important to American industry because the value of lost production time along with equipment repairs and replacements amounts to more than maintenance costs. With the information now available high maintenance costs and frequent failures can be held under control. Some practical suggestions on how to go about effecting such control is presented in this article.

Beginning of Control

Thirty years ago, a relatively short time, little was known about the control and prevention of corrosion. The electro-chemical theory of corrosion was just beginning to gain wide acceptance. Information and experience regarding the use of inhibitors was quite limited. Means for cathodic protection were yet to be developed. Protective coatings were of poor quality and the importance of proper application techniques were not well recognized. Plastics were not available and the stainless alloys and rubber linings were just becoming available for commercial use. Fortunately in those days, the corrosive conditions to be met were relatively mild compared to today's operations.

Since that time definite and great strides have been made in increasing our knowledge and understanding of corrosion and developing new materials to withstand severely corrosive conditions. A great amount of information is now available and it is no longer necessary to stand back and assume that high maintenance costs and frequent failures are a necessary evil. This of course, does not mean that corrosion can now be eliminated, but it can be minimized by study and application of available information on the subject of corrosion.

Corrosion Types

A review of the information concerning corrosion of metals shows at least fifteen forms of corrosion, almost all of them being electrochemical in nature. Their characteristics are well known. They are generally easily recognized and information regarding corrective measures or resistant materials is available in technical literature and from other sources:

General Corrosion—when thinning or loss of metal is not accompanied by any definite manifestation of pitting, cracking, erosion, etc. Inhibitors can frequently be employed to minimize general corrosion and where necessary, more corrosion resistant metals or other materials of construction can be used.

Pitting—where electrochemical action results in loss of metal at anodic areas. General corrosion is frequently slight even in instances where perforation of the metal occurs as a result of pitting type corrosion. Notable in this category is the pitting of stainless steel and aluminum in environments containing chlorides. The use of inhibitors is effective in minimizing pitting in many environments. Design considerations are important in many instances.

Stress Corrosion Cracking—where cracking occurs as the result of the combined effects of static stresses and corrosion, and generally without noticeable loss of metal. Typical examples of this form of corrosion are the season cracking of cold formed or worked brass in atmospheres containing ammonia and the cracking of the austenitic stainless alloys in presence of chlorides.

Caustic Embrittlement—similar to stress corrosion cracking, except that it is limited to conditions where caustic is involved. The difficulties encountered in operating boilers a number of years ago are well known. The most common occurrence now is the failure by cracking of carbon steel when it is used in the as-welded condition for handling caustic solutions above room temperature.

Galvanic Corrosion — where the more noble of two metals in contact in an electrolyte causes electrochemical attack of the less noble metal. Perhaps the best example of this form is the use of zinc to protect steel and aluminum equipment. Galvanic protection of the equipment is obtained as the result of the sacrificial corrosion of the zinc.

Hydrogen Embrittlement and Attack—where hydrogen generated by contact with process solutions enters metal and causes loss of ductility, microcracking and blistering. Aqueous hydrogen sulfide frequently causes failure of steel equipment as the result of such effects.

Crevice Corrosion—where localized attack occurs on surfaces partially shielded from contact with corroding medium. This also includes concentration cell and differential aeration effects.

Intergranular Corrosion—where attack is concentrated at grain boundaries without appreciable general corrosion. This was a common occurrence in stainless steel equipment 10 to 15 years ago before the effects of carbide precipitation were understood. Failures are relatively infrequent today and further improvement in this respect will come as the result of using the stabilized or the low carbon grades of the austenitic stainless alloys.

Dezincification — where the zinc constituent in brasses is selectively removed leaving sponge copper behind in essentially the original shape and volume of the unattacked piece.

Address presented at Plant Maintenance and Engineering Conference, Chicago, Ill., January 25-28, 1954.

This effect is generally limited to brass compositions containing more than 15 per cent zinc. The additions of small amounts of arsenic, antimony and tellurium to the metal will generally minimize, if not prevent, this form of corrosion in brass.

Graphitization — where galvanic corrosion occurs between graphic and iron constituents in cast iron with resultant formation of spongy mass of corrosion products. The original shape and volume are generally retained. The low alloy cast iron materials are relatively immune to this form of corrosion.

Erosion-Corrosion—where the effects of velocity remove protective films and cause increased rate of corrosion. This is most likely to occur in liquid systems which contain solids.

Impingement—similar to erosion—corrosion except solids are generally not involved and specific effects are more localized. Perhaps the most common occurrence of this form of corrosion is in non-ferrous alloy condenser tubes near the inlet ends. A reduction in velocity or turbulence will minimize this difficulty.

Fretting Corrosion—where corrosion is accelerated by mechanical removal of films or corrosion products. This form of corrosion is generally confined to machine parts with small relative motions and high unit loads.

Oxidation—where, generally at elevated temperatures, metal oxides are formed by direct chemical reaction and losses occur as scaling.

Sulfidation — where, at elevated temperatures, sulphur bearing atmospheres cause intergranular attack. This is limited for the most part to alloys of high nickel content.

Classifications Overlap

It is evident from this brief description of the better known forms of corrosive attack on metals that they overlap and may not always be well defined. In some instances several forms of corrosion may occur simultaneously. The field of the study of corrosion of metals is a large one and may be complicated by many ramifications.

It would be amiss, even in this brief discussion of corrosion control and prevention, not to mention the non-metallic materials available today for use in combatting corrosion. There are almost as many different non-metallic materials as there are metals and alloys and their use has provided economical solutions to many difficult corrosion problems.

Metallic contamination has become a very important consideration, and in some instances a limitation, in the use of metals for equipment for processing or handling synthetic textile fibers, pharmaceuticals, and a host of other products where quality is lowered by such contamination. The use of non-metallic materials, and in particular the plastics and elastomers, has proven to be very attractive for avoiding metallic contamination as well as corrosion. The use of the latter materials is limited to relatively low pressures and service temperatures, say 150-250°F. depending upon material, and chemical exposure involved, but they are gaining wide acceptance and use in spite of such temperature limitations.

Use of Plastics

There are several types of plastic materials that have been accepted as economical improvements over metals for a number of corrosive conditions. Notable among these are polyethelene, polyester-fiberglas, styrene-synthetic rubber blends and unplasticized polyvinyl chloride, all of which are available as piping, sheet stock and miscellaneous fabricated equipment items. These materials, particularly the latter two, are now being used extensively for ventilating ductwork for handling corrosive fumes and they have proven to be economical replacements for such materials as stainless steel, rubber lined steel and aluminum. A point of merit, which should not be overlooked in considering the overall cost of plastic equipment, is that they do not require painting for external protection against corrosion. Plastics are replacing metals in many applications because of their better resistance to chemicals, service life and economy.

Excellent progress has been made in developing rubber lining compounds, both natural and synthetic, for corrosive service applications and these have proven to be of real value in the field of corrosion engineering. These materials have become almost standard for handling aqueous hydrochloric acid solutions. They are useful and economical for handling dilute sulfuric acid solutions and many other chemical solutions that are corrosive to metals. Rubber linings are particularly attractive for use where abrasive as well as corrosive conditions are involved. The cost of rubber lined steel equipment is generally competitive or lower in cost than corrosion resistant alloy construction and it will provide good service life when properly engineered.

Rubber Limitations

At the present time the upper temperature limitation for rubber lining is 160-200 F. depending upon rubber compound and chemicals involved. Rubber linings are frequently used in combination with brick linings where processing temperature conditions are above the limit for rubber and they have proven to be good membrane linings for use in combination with brick lined steel constructions. A number of compounds are available which may be easily applied to equipment in plants and almost all of the compounds may be readily and adequately repaired in the plant.

One of the developments that has done much to improve the serviceability of rubber linings is the spark test to detect pinholes in the linings and joints or seams. The value of the spark tests for rubber lined equipment is now recognized by most of the fabricators and it can and should be made a condition of order and acceptance of new equipment.

The subject of maintenance painting and the use of protective coatings for combatting corrosion is of interest to almost all industrial plants and particularly to those having to combat acid fume conditions. A great deal of time, effort and money has been expended in the study of protective coatings and it is now generally agreed that a good protective coating job is dependent upon three main fundamentals; namely, proper surface preparation, proper coating selection and proper application. A compromise in any one of the three will seriously jeopardize chances of obtaining a good protective coating job.

Surface Preparation

Most of the studies on surface preparation have indicated that sandblasting is the best method. It is always wise to remove mill scale from new steel. Recontamination after cleaning and before coating should be avoided. The best answer to the latter point appears to be to paint as soon after cleaning as is practical.

Coating selection should be based on type and severity of exposures. It is obvious, for instance, that an outdoor service requires a coating that is resistant to weathering, an underwater service requires a coating resistant to water, and a chemical exposure service requires a coating resistant to the chemicals involved. This should not present any serious problem of selection in most instances—there are hundreds of coating systems available comprising about fourteen types, some one of which is able to resist almost any given set of corrosive conditions. The real problem is that coatings have serious physical limitations such as porosity, low strength, and brittleness.

The last of three fundamentals mentioned above, namely application, is generally considered to be the most important. The surface preparation can be excellent and the coating film adequately resistant to conditions, but if it is not applied properly, premature failure will occur. The main problem in application is to obtain freedom from pinholes and holidays in the coating. It is generally agreed that the best way to assure good coverage over surface roughness, sharp edges, and corners is to apply multiple coats or passes to a dry film thickness of at least three times the profile depth of the surface roughness. Observances of the requirements for adequate coverage or film thickness will probably do more to assure a good coating life than any other single factor. Minimum desired dry film thickness in almost all cases is five to six mils. Much of the success of the fibrated mastic type of coating which has proven to be quite good for severe industrial atmosphere exposure is undoubtedly due to good coverage over rough areas, corners and the relative absence of porosity. These coatings are sprayed on to about ⅛ inch thickness and are tested with spark tester to detect pinholes and holidays.

Uneconomical Applications

While on the subject of protective coatings, it should be mentioned that it is unwise and generally uneconomical to try to use steel equipment coated with chemically resistant coatings for handling chemicals that are quite corrosive to steel. This results from the fact that it is impractical to avoid some pinholes or holidays in the coatings and rapid attack of the steel will occur at such points. The highly resistant coatings such as the baked phenolic resins and the various vinyl resins are ideal for minimizing contamination of chemicals handled in steel equipment but they should not be used where 100 per cent protection is required.

It is believed the best possible approach, if not the answer, to industrial corrosion problems is to assign personnel to corrosion engineering work. They should acquire a good background in the knowledge of corrosion. This includes a knowledge of the corrosive characteristics of chemicals as well as the corrosion resisting characteristics of materials. They should become familiar with the physical and mechanical properties of materials of construction, the physical properties and characteristics of the chemical materials to be handled, information on availability and cost of materials of construction and fabrication techniques and limitations.

They will have to work with personnel in development, design, maintenance, purchasing, accounting and other groups, frequently under trying conditions and they should, therefore, have an ability to get along with other people. Common sense and good judgment are a must in this work; an economical and sound answer is seldom a matter of simple reference to chemical resistance formation.

Corrosion Technicians

A corrosion engineer's work should involve more than acquiring a background of information and simply selecting materials of construction for design and maintenance work. He should investigate cases of failure on high maintenance items and arrive at a decision to effect an improvement. This may involve an experimental program or changes in design or fabrication procedure and not necessarily materials of construction. He should set up specifications covering materials, procedures, heat treatment, etc. for new or repaired equipment. He should make inspections of new equipment to see that specifications have been met and existing equipment to see that corrosion difficulties are not developing. He should help establish improved maintenance methods and preventive maintenance programs. Records should be set up for spare parts and materials.

Today the science and technology of corrosion control and prevention has reached the point where impressive reductions in cost and annual losses can be guaranteed by study and application of known corrosion engineering principles and information. Improvements in product quality and operating conditions with respect to housekeeping and safety hazards can also be obtained through corrosion engineering work.

Citrus Production Increases

CITRUS production around the world is expected to reach 429,000,000 boxes in 1953-54, a new record high and exceeding last season's revised estimate by two percent. The United States is expected to produce over 40 percent of the total citrus crop in 1953-54, nearly two-thirds of the oranges and tangerines, about 90 percent of the grapefruit, 40 percent of the lemons and 10 percent of the limes. Half of the world's limes are produced in Mexico.—Cold Facts.

DuPont President Predicts Continuing Prosperity

AMAZING and dynamic industrial progress" is the long-term forecast for the United States, Crawford H. Greenewalt, president of the Du Pont Company, said in a recent speech. He characterized as "nonsense" the viewpoint that the economy is reaching an industrial plateau from which progress will be made only as population increases. "It is tantamount to saying that the last scientific barrier has been crossed, that there is no fruitful objective for further research, and that man's appetite for a more abundant life has been fulfilled."

"The progress of genius and inventiveness is something that is always underrated," he declared, pointing out that ours is an economy of abundance which is shaped "by human courage, desires, and incentive" and not by inventories, government spending, or "the host of business indicators."

Addressing the Commonwealth Club of California on "Let's Take the Long View," Mr. Greenewalt said he could not predict what will happen to business this year because it depends on human decision in the home and in the office.

Since we have an economy of abundance rather than necessity, "most of the things people buy are deferable," he pointed out. So whether or not there will be a recession "will depend largely upon the direction of the national psychology and on decisions that are influenced less by rational economic reasoning than by simple confidence and optimism."

If people as a whole "feel that they wish to defer a large percentage of their normal purchases, we will surely have a recession. If they are confident, willing, and able to satisfy their desires, we will have a boom," he asserted. However, as to what it will be, "No one has yet learned how to measure or how to influence people's confidence."

Business must maintain its own confidence high and "its own economic temperature as near normal as possible," he said. "In this atmosphere, the corrections that will be applied will be small and not in themselves frightening."

"We must remember that America was built by people who wore rose-colored glasses," he declared. "It is essential as we make our way through the squalls and alarms of 1954 that we keep our eye on the main goal, which is the continuation of our progress to greater productivity, to greater abundance, to new products for the betterment of our lives."

The engine room of the Produce Cold Storage which also serves the new addition, reflects good management and engineering practices. Note the "Marbelized" treatment of concrete bases for the equipment.

Handling Operations

Speeded up in New Freezer-Storage Annex

New annex of Produce Terminal warehouse reduces excess movements and extra handling of commodities. Mechanized equipment used throughout modern two-story building

RECENT completion of its new freezer annex has provided the Produce Terminal Cold Storage Co., 1550 Blue Island Avenue, Chicago, Illinois with an outstanding example of flexibility. This Company now operates over 2,800,000 cubic feet of freezer, cooler and convertible refrigerated space in both multi-storied and single floor type plants, handling merchandise under high-ceiling palletized methods and low-ceiling hand stacked procedures, and utilizing both direct expansion and brine circulating refrigeration systems. With such adaptability of conditions and methods, storer's preferences or demands in handling and storing products can be met.

The original plant, an eleven story building, was completed in 1929 and remained the latest in refrigerated warehouse construction in Chicago for nearly twenty years. Confident of the continued increase in the public's acceptance of foods preserved under modern refrigeration methods and the consequent growth in its volume, the management of Produce Terminal planned and constructed what is now the newest and most modern refrigerated warehouse in the Chicago area. The new freezer building, located adjacent to and connected with the original refrigerated warehouse, gives the company's personnel the utmost in facilities for low-temperature freezing and storage and for mechanized handling.

Tunnel Connects Plants

The building, which fronts 250 feet on 15th Street and 140 feet on Loomis Street, only a short distance from Chicago's loop and directly adjacent to the South Water Market area, has a pleasing exterior appearance being a combination of buff face-brick and Bedford Limestone. It is connected with the original plant by an underground tunnel extending more than 100 feet under the B&O Railroad right-of-way.

In planning its construction, Produce Terminal's management wished to gain the advantages of the one-story mechanized operation and yet desired a two-story facility in order to increase the freezer capacities to a maximum. As a result, a two-story building was constructed on a two-level slope thus, in effect producing two one-story mechanized operations in one! The first floor of the new plant has its own dock facilities at the street level on 15th Street and the lower floor, located at the same level as the ground floor docks of the original plant, which can also use these docks via the convenient tunnel which joins the two buildings.

Inclined Conveyors

To achieve the maximum in product-handling efficiency between the two levels, provision was made for inclined conveyors in addition to two heavy capacity automatic electro-hydraulic elevators. Products are quickly moved from the lower freezer to the first floor dock on pallets by use of the elevators, twelve feet long, which easily accommodate the 4,000 pound capacity fork lift trucks and more than one palletized load. The elevators are wholly automatic; product placed on them can be sent on call to or from either floor location without an operator accompanying the load. Orders picked in break-out operations on the lower floor are di-

These three York blast-freezing water defrost units are mounted near the freezer ceiling at a height of twelve feet.

rectly transported to the route delivery trucks spotted at the enclosed truck dock on the floor above by power-driven conveyors.

Receiving and Shipping

Carefully planned receiving assembly and shipping areas are provided adjacent to both the first and lower floor freezers. This area on the lower floor occupies a space about 80 feet by 90 feet and adjoins the 15 ft high, 160x130 ft, minus 20 F storage room. On the first floor, the enclosed truck court and 8-bay dock, likewise 80x90 ft, leads into the 25 ft high, L-shaped, minus 20 F main storage freezer (160x140 ft and 55x45 ft) and the minus 35 F high ceiling, 50x45 ft sharp freezing room. These two freezer rooms have a capacity of approximately 12,000,000 pounds which, added to the capacity of the original plant makes this one of the largest cold storage plants in Chicago.

To obtain this high storage tonnage in their palletized operation, it was necessary to plan the holding freezers with but few supporting columns but yet designed to carry heavy floor loads. The column spacing is 26 feet on the lower floor and 52 feet on the first floor. There are no wall columns to interfere with the efficiently planned pallet layout. Floor slabs are designed for 500 pounds per sq ft loading. Coils, sprinklers and other overhead appurtenances were very carefully placed so as to provide maximum stacking clearances.

Loading Dock

In building the "15th Street Annex", as it is called, it was considered advisable to keep the dock as compact and as close to freezer entrances as possible. In this manner, operational efficiencies are effected and less supervision is required. Supervisory tasks are given every assistance possible as is evidenced by the plant's dock office which is elevated above the dock level and thus affords a view of the entire first floor and truck court area. Similarly, a unique communications system is provided so any person within the plant, at any location, whether moving or standing still, can converse with those in the dock office on the first floor.

Dock Ramps

To expedite the movement of mechanized equipment in and out of trucks, Globe Hoist Self-Leveling Dock Ramps are used at each of the eight bays. These adjustable steel dock plates are raised and lowered hydraulically so as to meet the tailgate of any truck which backs into position. The warehouse took particular pains in designing this ramp so as to accommodate both the small openings of city delivery trucks and large openings and elongated tailgates of the over-the-road trailers.

Office space is provided for tenants on the second floor, above the dock.

Excess Movements Reduced

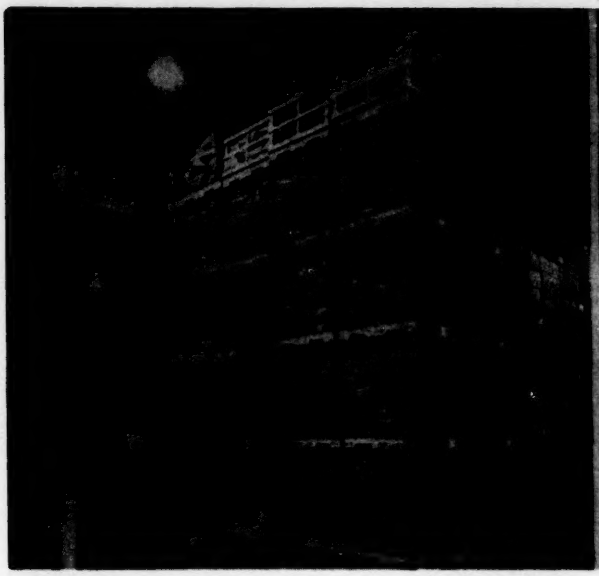
It is obvious that every effort was made in the planning and construction of Produce Terminal's new plant to reduce or eliminate excess movement or extra handlings. Steps were taken to speed each handling operation where possible. For example, to assure better traction for all mechanized equipment and thus gain starting speed, the floors throughout the plant are constructed with non-slip abrasives and, in the interest of efficient handling, the 48 x 40 in. hardwood pallet is designed for 4-way entry. Mechanized movement into the freezers through the Jamison infitting type freezer doors is easily accomplished without "breaking stride" by use of the automatic Air-Lec door operators.

Self Closing Doors

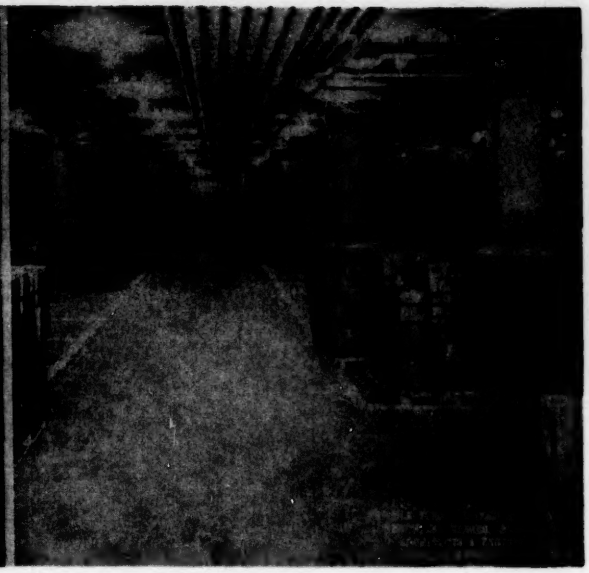
The main vestibule has self-closing, one-way, "V"-type flapper doors at the entrance end only; there is no door at the room-end of the vestibule which provides free access. By means of a system of ducts, a continuous defrost cooling unit mounted above the vestibule picks up the inrush of warm air when the doors are open, cools it and blows a curtain of cold air across the room-end of the vestibule to keep the cold air from rushing out. Doors to the lower freezer are equipped with the air curtain to prevent infiltration and have no vestibules or vestibule doors. The main vestibules are of insulated plywood construction and their floors are equipped with a radiant heating system to prevent icing. Door sills are of oak strips which are replaceable and will not collect frost.

To effect rapid commodity transfer between buildings via the tunnel, "Trackless Trains" are used. The Mercury "Tug" tractor and trailers quickly gap the distance between the

Exterior view of new addition, showing top of main plant just beyond.



Wrapped meat stored in freezer to 20 foot heights. Note use of stacking iron columns to support pallets.



Freezer storage on lower floor, equipped with radiant heating system imbedded in concrete.

buildings, moving shipments to the dock for delivery or to the freezer rooms for stacking. In the refrigerated storage room, 4,000 pound capacity Mercury "Yak" fork lift trucks pick the loads off the trailers and stack them to near-ceiling heighths. The Mercury Manufacturing Co. equipment was chosen for it readily met the company's requirements of fork lift trucks coordinated with the Moto-Truck pallet transporter to effect the flow of commodity to and from the freezers.

This electric pallet transporter links the truck loading and unloading operations with stacking in the minus 20 F freezer storage. The Mercury fork lift operates comfortably in the 12 foot aisle and, despite the fact that its lowered mast height is limited to clear the 9 foot doorways, easily stacks the 2,000 pound pallet loads to 22 feet.

Stacking Iron

To assure stability in stacking, two ingenious aids are employed. A metal stacking iron which can be quickly inserted into a fixed position on the pallet, provides corner support for the unit-load above thus diverting the stack weight from the packages on the lower tiers. Also, a "split" pallet crate is used which affords the advantages of easy loading and unloading while likewise carrying the weight of the tier on the fixed sides rather than depending on the product for stability.

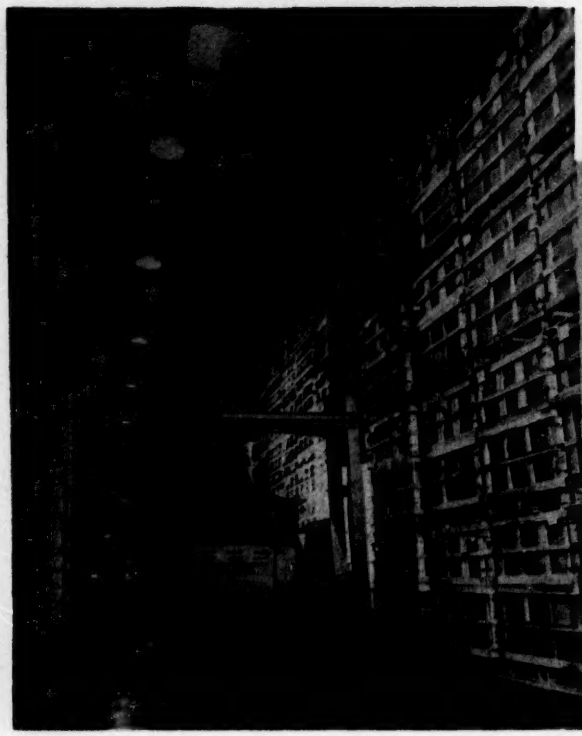
The building is insulated entirely with corkboard, the interior walls of which are painted aluminum. Corkboard walls are protected from damage by concrete curbs 16 inches high, which also provide stacking guides for the fork lift truck operator in wall spacings.

Lower Floor Freezer

The lower floor freezer is 12 feet below grade. The floor slab and the walls against the ground are equipped with a radiant heating system supplied from 1¼ inch pipe imbedded in the concrete through which heated fuel oil is circulated to maintain the temperature of the ground above freezing. It is expected that this will eliminate all dangers of frost heaving of the floor. Thermocouples are located so that ground temperatures can be observed. On November 24, when the readings were started, the ground temperature was 54 F and early in February was approximately 40 F. When the ground temperature reaches about 34 F, oil at 45 F will be circulated through the pipes.

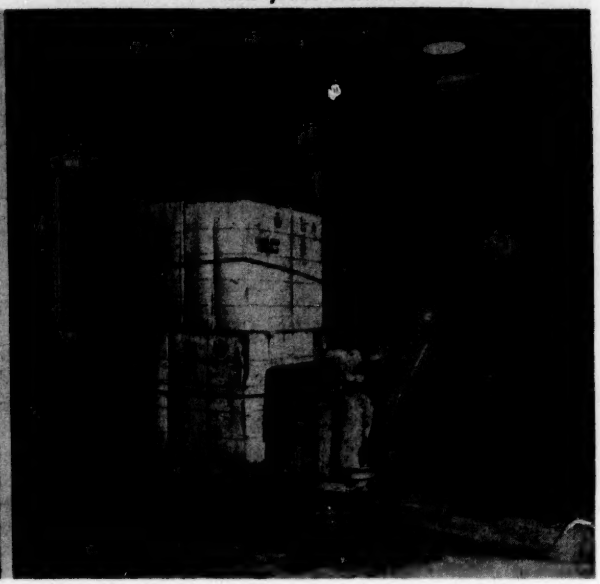
Lighting is supplied in the freezers to above 10 foot candle intensity and the lights are controlled by 30 amp safety switches mounted in warm areas. All lighting is supplied from open wiring in order to avoid the possibility of condensation and short circuiting which may occur when leads are installed in conduit.

Fork lift entering freezer through "V" type flapper doors of main vestibule. Infitting Jamison freezer doors are opened mechanically with airlec door operators, by rope pull.



Left: Four thousand pound fork truck stacking "split" crates containing loose products to 22 feet. Aisles are 12 feet wide. Note fin coils.

Below: A self-leveling dock ramp meets trucks. Tailgate electric pallet jack transports unit pallet load to and from trucks.



Refrigeration

The storage freezers are refrigerated with fin coils through which ammonia liquid is circulated. The coils are located over aisles for convenience in defrosting with hot gas. All coil control valves are mounted on headers located above the vestibule. The sharp freezers are equipped with both fin coils for moderate freezing load and for maintaining freezer storage temperatures, with three York blast freezer units for quick freezing. These York units total 50 tons and are water defrost units. A melting tank is provided for use when the room is being defrosted, and when through defrosting the contents can be dumped. All of the refrigerating equipment used in the annex is connected up with compressing and condensing machines already in operation in the engine room of the main plant. The engine room is equipped with three horizontal direct motor driven compound ammonia compressors.

The Produce Terminal Cold Storage Co. is under the direction of William A. Sizer, president, William C. Baker, vice-president and Paul A. Vollmer, general superintendant.

The new building and layout was designed by Henschien, Everds & Crombie, architects and engineers of Chicago. General contractor for the building was the Turner Construction Company of New York. Refrigeration equipment was furnished and installed by Westerlin and Campbell Company, York representatives in Chicago. The design and layout of the ground warming system was made by D. C. Patterson & Associates, York, Pa. Insulation was supplied and installed by the United Cork Company. The cold storage doors were furnished by the Jamison Cold Storage Door Company. Elevators were supplied by Hollister & Whitney Company, Quincy, Illinois. Sprinklers were supplied by the Grinnell Company, Chicago.

Metal stacking iron used by the Produce Terminal Cold Storage Co. This can be inserted into a fixed position on the pallet.

Refrigerated Cave Storage

THE acquisition of technical data on the natural character and behavior of refrigerated underground spaces used as cold storages is a task now assigned as one of his duties to Bill Hoover of The Refrigeration Research Foundation. Mr. Hoover has visited the Natural Cold Storage Company at Bonner Springs, Kans., and has discussed the subject of underground spaces for cold storage with Kansas State Geologists.

The use of underground formations for the construction of cold storages is a question of considerable interest to the refrigerated-warehouse industry. Further conferences with geologists in various parts of the country are contemplated because it is already clearly evident that not all underground spaces are suited for use as refrigerated storage. The sole purpose of the Foundation in pursuing this subject is to obtain information now, before any future need (possibly in an emergency), develops on the physical essentials and potential performance of underground spaces when used as refrigerated spaces.—TRRF Information Bulletin.

Practical Refrigerating Engineer

NATIONAL ASSOCIATION PRACTICAL REFRIGERATING ENGINEERS

Warehouse Addition Built in 100 Days

California Packer-Warehouse constructs new one-story freezer-storage building with 350,000 cubic feet in 100 days. Immediate needs of facilities called for special rush construction.

REGIS GUBSER
Vice President NAPRE
Engineer-Vice-President
California Consumers Corp.
Los Angeles, Calif.

THE California Consumers Corporation, Los Angeles, Calif., with its production of *Prime Froz-n* foods mounting each year, found itself in need of additional freezer storage, and its lima bean season coming up fast. An addition was required. The logical location for the new building was adjacent to present facilities. Just north of its present class A cold storage building was a plot of ground 120 x 156 ft with only two frame sheds on it from the days when the Company's ice operations were conducted from horses and wagons. It was decided to use this location and construct a one story structure as quickly and as economically as possible.

While building designs were being worked out and plans drawn, the site was cleared, and tests were made on the soil for foundation loads and moisture content to determine the possibilities of heaving as the freezer temperatures penetrated into the ground. The surface soil was of good quality and load bearing capacity, but this was found to be only 1 to 2 ft deep. Under the good soil was 4 to 6 ft of black adobe about the consistency of molding clay with very poor load capacity. It was necessary to go below this to good firm red sand and clay mixture with a load capacity in excess of 2000 lbs per sq ft.

Paper given at meeting of Los Angeles Chapter, NAPRE.

EXECUTIVE OFFICE, N A P R E
433 N. Waller Ave.,
Chicago 44, Ill.
OFFICERS
President, L. J. Vivien,
New Orleans 22.
Secretary, J. R. Kelahan, Chicago 44.

Operating engineers of all refrigerating plants are invited to affiliate with the National Association of Practical Refrigerating Engineers, an educational association.

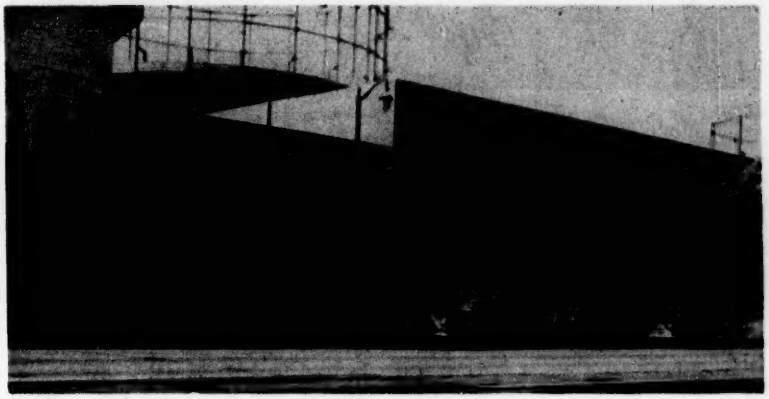


Fig. 1. Side view of California Consumers new addition showing truck entrance to loading platform.

Frozen Soil Expansion Tested

To test the expansion of the adobe soil, a cylinder was made of a piece of 6-inch diam. pipe about 16 inches long and a ½-inch plate with a small hole in it welded on one end. A representative sample of adobe was uncovered and this cylinder driven into the soil. The soil filled it up to the small hole. The cylinder was then dug out completely full of adobe soil. Excess adobe was scraped off level with the top of the cylinder and it was placed in a minus 20 F freezer room. After it had been in the freezer for two days, the expansion in the center of the cylinder was found to be less than 3/16-inch and no expansion at the edge of the cylinder.

Although the results of this test were not unfavorable and the fact that we have had no heaving trouble with our existing building adjacent to this site, it was never-the-less decided to insure against any heaving by burying 1¼-inch pipe on 8 ft. centers under the surface of the ground over the whole area as a precaution (see Fig. 2). Minor expense involved at this stage of construction for providing some means of delivering heat under the floor insulation is an inexpensive insurance policy against heaving.

Property Survey Pays Off in Space

Another precaution which should always be taken is to have a plot survey made by a licensed surveyor. Consumers' found that it had about three inches more land between our building and our neighbor's property than our records showed. We did not dare build on this three inches until the surveyor proved that our original record was in error and the land was actually ours. This extra three inches gave us 780 cu. ft. more storage in the new building at very little expense.

Since the foundations had to be quite deep to get the footings below the adobe, a ditch digging machine was employed to cut the cost of excavating for these deep footings. Wood forms were used only from the surface of the ground to the finished floor line. Concrete was poured the full width of the ditch and up to the floor level in one pour.

Brick construction was selected for the walls because in this case it of-

Fig. 2. Workmen adjusting slope of 1¼ in. pipe coil for sub-soil heating. Circuit was laid as precaution against floor heaving. A two-foot thick pumice fill was placed over the floor pictured, and a 5-inch concrete reinforced finish slab above. No manufactured insulation was used. Thermocouples were buried in the soil for recording temperature.

fered the shortest construction period for the following reasons: First, the steel columns could be erected two days after the foundation was poured; second, the brick wall could be started four days after the foundation was poured; third, tilt-up construction would have required the floor to be finished before the walls were started. It was planned to use a two foot pumice fill for floor insulation, and considerable time was required to complete the fill since the pumice had to be hauled 130 miles in only two truck and trailer loads per day. It can readily be seen why it was desirable to delay pouring the floor slab until the construction was well along.

Pumice Filling

As soon as the walls were completed the pumice filling operation was started and carried on during the roof construction and insulating period. The brickwork was of the reinforced grout center construction, as required by Southern California building codes to resist seismic forces. The construction of the wall progressed very fast with the application of modern material handling methods to the carrying of the bricks and mortar (See Fig. 3). Forklifts were one of the greatest assets.

Roof Structure

The roof construction consisted of prefabricated steel plate girder beams supported on steel columns set in the brick walls, with only four 8-inch pipe columns in the center of the room. (Fig. 4) This type of roof construction was selected only after other types such as wood trusses were thoroughly investigated. The factors by which the plate girder trusses were considered superior were: opportunity for better vapor seal, lower total height, less insulation cost and less volume of room to refrigerate.

The roof framing consisted of 2 x 12 inch rafters set on two foot centers along the upper flange of the plate girders. The rafters were solid blocked every four feet to provide better nailing for the roof sheathing

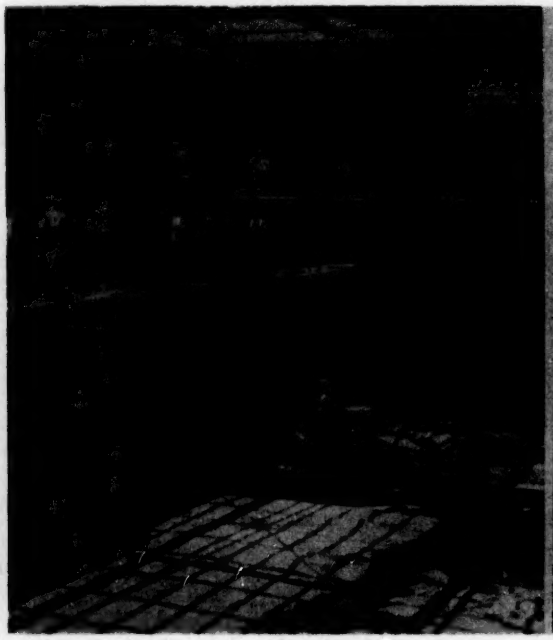


Fig. 3. Modern material handling was utilized to fullest practical extent throughout construction. Fork lifts delivered bricks and mortar on pallets for all levels of wall construction.

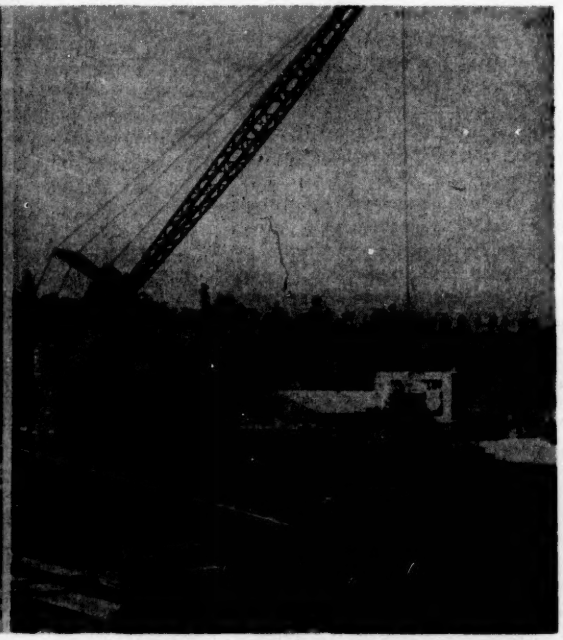


Fig. 4. Roof girders being hoisted in place. Complete construction was accomplished in 100 days. Note precut solid blocking for roof joists stacked awaiting installation when iron work was complete.

Fig. 5. View showing portion of 18,000 ft. ceiling refrigeration coil. Interior of the room shows a mezzanine floor at one end. This was the result using one wall of the existing building for the new room. The space in back of the large columns was an enclosed hallway to the various rooms in the existing building. The brick filler walls between the columns were removed.

which was ⅝-inch plywood, and also provided 2 x 4 ft. cells for the Palco wool insulation. Special efforts were made to effect a good vapor barrier where rafters were attached to the walls.

The under side of the rafters were covered with 5/16-inch plywood, in which were drilled four ¾-inch holes for each cell. These holes provide the necessary breathing vents for the loose fill insulation, and means of letting water out should a leak develop in the roof some years from now. The ⅝-inch plywood was used in place of two layers of ¾-inch diagonal sheathing required to resist the seismic forces of earthquakes experienced in this locality.

Loose Fill Insulation

The Palco Wool insulation was easily applied by the blowing technique after the sheathing was applied to the rafters and before the plywood roof deck was placed. The cellular construction of the roof framing proved to be a convenience in checking the density of the Palco wool. All that had to be done was to remove all the wool from one cell, measure the cell and weigh the Palco wool in cartons or bags.

A vapor barrier of Laykold Adhesive was sprayed on the brick wall before the wall insulation was started. The wall framing to receive the Palco wool consisted of 2 x 6 inch studs on two foot centers spaced away from the wall so as to provide 8 inches of insulation. The spacers were approximately 6 feet apart horizontally and fastened to the brick wall with a Ramset gun. The covering over the insulation consited of 1 x 6 inch wood sheathing, with special effort made to leave a small breathing space between each board. The interior of the room was finished by spray painting walls and ceiling with 150 gallons of latex type white paint.

The floor insulation consisted of a natural pumice fill 24 inches in depth. This material as a K factor of .9 Btu per sq. ft. per degree F. temperature difference. The 5-inch concrete floor was poured directly on this fill with a wire mesh reinforcement in the center of the slab. The floor was poured in 20 x 20 ft. areas in a checkerboard fashion to minimize shrinkage cracks.

Refrigeration

Refrigeration in this room is provided by 18,000 feet of 1¼-inch pipe coils hung on the ceiling. (See Fig. 5). This quantity of pipe was divided into five coils each fed by a thermal expansion valve. The refrigeration arrangement has proved very satisfactory to date. The room is holding minus 12 degree F with very little frost on the coils after four months of operation. The success of this method is attributed to the very effective cooling by direct radiation.

The two exterior refrigerator doors were of special size and of our own construction, using plywood, Fiberglas and pine frames reinforced with steel. The gaskets of the doors are installed with heater cables of our own design to prevent condensation collection and subsequent freeze-up. Doors are operated by Air-lec pneumatic open and closing devices.

Thermocouples were buried under the concrete floor at two foot intervals, to a depth of 10 feet below floor, to check on the migration of heat and resulting low temperatures into the ground. At first readings were taken at daily intervals, then weekly, and are continuing at gradually decreasing intervals until the conditions within the soil become constant.

News Notes and Chapter Activities

Los Angeles

FRED HERR

THE effect of air conditioning on growth of plants was described at the February 3 meeting, Los Angeles Chapter, by Dr. Harry Highkin, Biology Division, California Institute of Technology, Pasadena. Dr. Highkin's talk was concerned mainly with the activities and facilities of the Plant Research Laboratory at Cal-Tech, in the course of which he told how air conditioning to control the temperature in greenhouses had contributed tremendously to modern plant research.

"One of the most important phases of plant growing is the control of environment," Dr. Highkin said. "This, of course, makes weather an important factor—how to control the weather, or atmosphere, inside a greenhouse. Most greenhouses still are not air conditioned." The comparatively slower acceptance of air conditioning in greenhouses, he pointed out, is due in some measure to the fact that the average home or factory air conditioning installation would require changes and adaptions before being completely practical for the special requirements of greenhouses.

The speaker described how air conditioning of greenhouses had its inception in the Netherlands, where air control for growing tulips and orchids has been in use for years. For proper plant growth, Dr. Highkin pointed out, a greenhouse must have light, the air must be heated when inside temperatures fall below functional purposes, and there must be ventilation. He added that, of course, a greenhouse must be cooled if inside temperatures get too hot in summer.

"On the whole," Dr. Highkin said in his conclusion, "the development of proper air conditioning has broadened the use of greenhouses tremendously. I should estimate that their usability has increased at least 50 per cent, for without proper air control the average greenhouse in the past was below effective functioning status two to three

months during the extreme hot and cold periods each year".

The preliminary class with Elmer Johnson as instructor, was "Refrigerated Enclosures," from Chapter 6 of Guy King's "Basic Refrigeration." President Frank Eccleston presided over the business session. Frank G. Muzzy, Skazol Company, was presented with a table model clock radio. "The better to get you out of bed when you have a golf date with me," Eccleston remarked. Muzzy was chapter president in 1953; the clock-radio a gift of appreciation from the chapter.

Herbert N. Royden reported on arrangements for the visitation to the Shell Company ammonia plant, Ventura, Calif. on Saturday, April 10. Plans call for NAPRE members to leave Los Angeles in time for the luncheon which Shell officials will host. Mike Julius is chairman of the car pool committee. Feature of the January 6 meet was a talk by David A. Nurse, Robert B. Holland Co., on Low Temperature Frost Control With Hot Gas Defrosting. A special demonstration model of the Kramer unit was shipped from the factory for exhibition at this meeting.

Attention was called to the fact that all NAPRE members have been invited to attend the ARI educational conference on refrigeration and air conditioning in Long Beach, March 11, 12 and 13. The conference is sponsored by the Refrigeration Service Engineers Society, Refrigeration Equipment Wholesalers Association, Refrigeration Air Conditioning Contractors, and the Air Conditioning and Refrigeration Institute. It will also be the annual convention of the California Association, RSES. A Refrigeration exhibit with some 70 firms scheduled to present their latest equipment is a feature.

Dallas

GEORGE F. STEWART

AT the second meeting in January of the Dallas Chapter, Obert K. Irvine conducted the refrigeration lesson, section 10, chapter 20 on compression calculations. After covering most of the chapter, an open discussion was held on actual experience in operating. F. B. Reik, Jr., past president, gave some interesting experiences he had had with compressor maintenance.

E. R. Hallowell conducted the class February 2, reviewing and covering the balance of section 10. At this meeting, two new members, J. C. Allen and B. F. Flowers were welcomed.

Yakima

ELMER TOOP

AT the meeting on January 13, the following were elected officers: President, Ray Strait, Holtzinger Fruit Co.; vice-president, Arthur Krum, Art Krum Co.; financial secretary, Elmer A. Toop, Holtzinger Fruit Company; recording secretary, Galen Sutton, Yakima Fruit & Cold Storage Co.; sgt.-at-arms, Carl Casteel, Holtzinger Fruit Company. George Tilburg was appointed instructor of 1954. George is at present employed at General Electric operations at Hanford Atomic plant.

New Orleans

DAN BEHRE

THE Officers of Louisiana Chapter No. 2 were installed January 13: President: Frank L. Chase, Hibernia Bldg. Superintendent and a National Director; Vice-Presidents: Milton D. Mancuso, chief engineer, New Orleans Grain & Feed Co., Damian Fischer, chief engineer, Hausmanns, Inc., Vernon Foret, chief engineer, Mercy hospital; Treasurer, George J. Whitman, Partner, Whitman, Holloway & Oliver; Secretary, Leo J. Vivien, National President; Financial Secretary, Eugene W. Orth, engineer, Gardners & Shippers Ice Co.; Sergeant-at-Arms, Joseph Vernaci, engineer, Hibernia National Bank; Educational Chairman, Marion G. Olivier, Partner, Whitman, Holloway & Oliver.

The second regular meeting was held in the Roosevelt Hotel January 27, presided over by President Frank Chase, a National Director. It looked like a national meeting with our secretary, Leo J. Vivien, the national president and Dick Kelahan, the national secretary, on the rostrum. Jack Luck, professor, discussed heat calculations. He elaborated on the co-efficient of heat transfer of various insulations and building materials. He pointed out that it is insulation and not masonry that prevents heat loss.

After the educational program was over, National Secretary Kelahan explained to the members the aims and services of the national office.

Members and wives assembled for annual Installation of Officers

Board of Directors: James Chaisson, chairman, George Fairchild, John Luck, Bart J. Mancuso, John Mariakis and Max Sofer. The installing officer was Past President Addison E. Wegener. A gift was presented the outgoing president, J. Chaisson, by F. X. Gillio, past chapter president.

James Chaisson, retiring president, presents gavel to Frank Chase.

The members were accompanied by their ladies and the able Entertainment Chairman, Jerry Vieagas, arranged for ample refreshments and band music for dancing. President Chase appointed the following standing committee chairmen: Finance, Clifton J. Begeman, Publicity, Daniel Behre, Membership, Max Sofer, Publication, John N. Mariakis, Entertainment, Gerald A. Vieagas, Building, A. E. Wegener. In addition, in order to get an early start on activities for the national convention, he appointed A. E. Wegener as General Convention Chairman, and Mrs. Leo J. Vivien as head of the ladies group.

Memphis

CHAS. CONLEY

AT the first meeting of the new year, January 6, past national president Alvis J. Clay installed the chapter officers for 1954. He instructed each new officer in his duties and concluded with a short address on his expectations of the Memphis chapter in '54. The new president, E. H. Dupuy announced that P. O. Henderson was his selection as chairman of the membership committee and C. W. Sullivan as chairman of the Operating Data Book committee.

The chapter secretary reported on the activities of the chapter during '53, covering statistics on members, accomplishments of the educational committee, and elaborating on the fact that a dozen odd firms in this area pay the dues of chief engineers and, in many instances, their entire engineering staffs.

At the Jan. 20 meeting, members assisted a brother engineer in estimating the amount of refrigeration and the size of machine required to cool 600 gallons of milk per day, a problem which had arisen in his plant recently. E. J. Todd, assistant engineer at Lowensteins was elected to membership.

Colton

C. H. PURKISS

PRESIDENT T. C. Bangs, at the January 13 meeting, welcomed all to another year of education and pleasant association. Due to illness of Mrs. Bonter, Secretary Harry Bonter was unable to attend so Charley Purkiss substituted.

Frank Scherer, Educational Instructor, delivered an excellent talk on Niagara No-Frost evaporator coils and modulated back pressure regulators recently installed at his plant, Nat'l. Ice & C. S. Co., Riverside. Program Chairman, Charley Purkiss, announced programs by the following firms during the Spring sessions: Shell Oil Co., General Electric, and W. P. Fuller Co. A tour through National Ice & Cold Storage Co., Riverside, is scheduled for June 16, and on September 8 will be the Annual Picnic which, of course, includes the ladies.

Following the meeting, we then enjoyed refreshments. Roy Ashcom sure knows where to get good doughnuts. Lloyd Schroeder made the coffee and one person wondered aloud if it came from the Texas Co. wells. Well, it had one quality, one cup did the work of two.

Members-at-Large

Leroy Etzel

DUES receipts from members-at-large have been pouring into National Headquarters during January, thus reminding the National officers of the wide dispersion of our members in this category. For the information and edification of our general membership, in the next few months this column will list some of these members geographically with their business affiliations. From this the membership may learn a practical lesson of the great number of industries employing refrigeration today throughout the United States.

Among some of the members in New York City are Eddie M. Nelson, chief engineer of Peoples Realty Corp.; G. J. Patitz, advisory engineer of Standard Brands, Inc.; Reginald O. Tanner, stationary engineer, Dept. of Hospitals, City of New York; and G. N. Omohundro of Allied Chemical & Dye Corp. Jumping over to Brooklyn we have Walter F. De Houst, treasurer of Butler's Warehouses Inc.; On Long Island, Russell Foster and John H. Powers, refrigeration and air conditioning personnel at Sperry Gyroscope Co. Clarence C. Broeker is manager of Youngstown Cold Storage Co., Inc., and William F. Riley has the same position at Geneva Refrigerating Corporation.

New England was also represented in the early remittances by Benjamin Deliso, superintendent of Pioneer Valley Refrigerated Warehouse Inc., Springfield, Mass.; and William C. Rehor, service promotion engineer of Carrier Corporation at Chicopee Falls. One of our newer members is Daniel T. O'Neil, supervising engineer at Narragansett Brewing Co., Cranston, Rhode Island; and an associate member is Nevin W. Day, president of The N. W. Day Supply Company at Hartford, Connecticut.

Six cities are represented in New Jersey by John Pondish, service man for Montgomery Engineering at Jersey City; Hubert Hooper, engineer for Merchants Refrigerating Co. and Oliver W. Callaway, chief designer for Mars Engineering Inc., both at Newark; Otto J. Nussbaum, chief engineer for Kramer-Trenton; Joseph A. R. Larsen, maintenance man for Wheaton Brass Works at East Keansburg; Alexander C. Speer, factory engineer for Western Electric Co. at Kearney; and George C. Schneider, plant superintendent for Glassboro Cold Storage Corporation at Glassboro.

In that city of brotherly love, we have heard recently from Raymond G. Hassel, sales manager for Henry Bower Chemical Mfg. Co.; William Brownlow, vice-president and O. C. Boughton, assistant secretary of Quaker City Cold Storage Co., Inc. Down at Lancaster we heard from Augustus L. Rineer, chief engineer for Lancaster Ice Manufacturing Co.; and at Sharon from Albert Stuart, engineer, Sharon Cold Storage Company.

Ohio came in for a fair representation in the persons of Walter H. Harvey, chief engineer, Merchants Cold Storage, Cincinnati; Wm. C. Ludwig, division superintendent, City Products Corporation at Toledo; and Omer B. Gaines, environmental test operator, Wright Field, Dayton. William R. Robinson is an associate member and president of Ohio Galvanizing & Mfg. Co. at Niles. Of course, we shouldn't forget our member of over thirty years standing, Walter John Mikker, now retired after 42 years of refrigeration engineering. He was chief engineer for Telling Ice Cream Co., Columbus.

Stockton-Modesto

HARRY DYER

AT the regular meeting, January 11, the Stockton - Modesto chapter elected the following officers for 1954: President, Jay Jackson, Fresno Consumers Corp.; vice-president, Dick Morgan, Modesto Refrigerating Co.; secretary-treasurer, Harry C. Dyer; sgt.-at-arms, Gaylor Lucas, Modesto Refrigerating Co.

The new president appointed M. L. Holland, Waino Menkkinen and C. C. Berkley as members of the educational committee. He appointed D. B. Desjardins and Wm. Tordsen as the refreshment and entertainment committee. Roy Keir, Keir Refrigeration Co., Modesto, transferred his membership from a membership-at-large status into the Stockton - Modesto Chapter.

Detroit

BOB DOREMUS

THE Detroit chapter of NAPRE held a combined meeting with the Refrigeration Contractors Association of Detroit on Wednesday, January 20. The educational session was presided over by R. N. Meyer, Chicago District Manager, Alco Valve Company, who presented a full color motion picture entitled "The Story of Automatic Refrigeration Control." As chairman of this chapter's Educational Committee, and as a member of the National Educational Committee, the writer recommends this film as bibliography to Chapter 9 of the Guy R. King course. This chapter covers temperature and pressure indicating instruments such as thermometers and gauges. The film bridges the gap in the chapter on automatic controls. In the film itself one of the latest forms of teaching technique is utilized by carrying the story along in interesting dialogue. Two new members were initiated at this meeting, Howard R. McDonough, Commercial Refrigeration Service Co. Inc., and George Akehurst, Bokin Bros. Inc.

St. Louis

KEN HOLADAY

A HIGH percentage of temperature controls returned to the manufacturer are not defective, but instead have been improperly installed, according to Dean Eggert, White-Rodgers Electric Company. Speaking on the St. Louis Chapter educational program, January 18, Mr. Eggert explained the principles and construction features of a number of industrial thermostatic control devices. He pointed out the necessity for installing this equipment in such a way that the sensing element can feel the desired conditions. He described some interesting experiences, illustrating how easy it is to correct faulty operation often by some simple change in the position of the sensing element.

New members of St. Louis Chapter: Bill Allen, Joe Milardo, W. Miedaner, Charles Gudermath.

San Francisco

LEWIS BROOKS

AT the meeting of January 13, the following new officers were elected to serve California Chapter No. 1 during the current year: President, Frank Cordoza, chief engineer, Golden State Company, Ltd., Battery Street; vice-presidents, Howard Boudreau, engineer, Cyclops Iron Works, Refrigeration Division, and Henry Guilmette, sales engineer, Pacific Scientific Company; treasurer, Charles Stewart, operating engineer, Golden State Company, Ltd., Guerrero Street; secretary, Lewis Brooks, engineer, Carrier Corporation; sgt.-at-arms, Fred Imsand, assistant chief engineer, Spreckles Russell Dairy Co., San Francisco.

The board of directors elected were H. O. May, Walter Sandholt and William S. Orton. The vice presidents were assigned the chairmanships of membership and educational committees, and the secretary will head the attendance committee. Orman New was appointed chairman of the entertainment committee. Don Bryant, San Francisco City College, will continue as instructor.

Ice Tank Stop-Leak?

MORE ON QUESTION NO. 980

Our ice tank has developed a slow leak. Can you give us any information as to what we can put in the tank to stop this leak? At one time there was a firm who advertised material for this purpose.—R.W.C.

ANSWER: Concerning the plugging of small leaks in an ice making tank, please be advised that we have used a stop leak Mica with very great success. This product is manufactured by the All Mica Co., in Atlanta, Georgia. Perhaps this will be of assistance to R.W.C.—E.C.F.

ANSWER: Thank you for your kind assistance. We are not going to take action on this matter until Spring. Our brine went down about two inches and has stopped, and it may be a brine pump packing leak caused our trouble.—R.W.C.

pH by Hydrometer?

QUESTION NO. 986: Is it true that it is considered good practice to periodically test calcium and sodium chloride with a hydrometer to determine the pH value?

ANSWER: False. The purpose of testing either calcium or sodium chloride brine with a hydrometer is to determine its salt concentration, or its specific gravity, so that by looking in the tables its freezing temperature may also be found. The pH value of a solution tells us its relative acidity or alkalinity which have to do with its corrosive properties. On the pH scale 7 represents exact neutrality, that is the solution is neither acid nor alkaline. Higher values indicate alkalinity, lower values denote acidity. The pH values are determined by adding certain chemicals to the solution, or by immersing paper which has been treated with certain chemicals into the solution. In both cases the pH of the solution is determined by change of color.—H.G.V.

Automatic Control of Egg Storage Temperatures

QUESTION NO. 987: Is it considered advisable and practical to maintain temperatures of 31 F. in cold storage rooms containing eggs and pears, chiefly by means of fully automatic controls? We have been storing eggs for years and would appreciate information as to results obtained by automatic control of storage temperatures for eggs, pears, and other fruits.

ANSWER No. 1: Please be advised that it is considered practical in a cold storage industry to maintain temperatures of 31 F. in cold storage rooms containing eggs and pears. However we have not as yet learned of any cold storage plants of large capacity that have gone over to automatic control of these rooms. We understand there are quite a few cold storage plants in the Northwest that store apples and pears that are under automatic control but have not learned of their using the same facilities for the storage of eggs.

Perhaps one of the largest cold storage firms devoting a great deal of their space to egg storage (in 1952-and 53 they stored approximately 60 percent of all the eggs in storage in the United States at any one time) is here in Chicago. We are informed that they try to maintain a temperature of 30 to 31 F. at all times with a relative humidity of 85 percent. However, they use no automatic controls on their refrigeration system, an indirect brine refrigerating plant. Humidity is maintained by sprinkling the floors by hand. Small ½ hp fans circulate about 2500 cfm of air in a room of 80,000 cubic foot capacity. Often these rooms are used to store other commodities in the same temperature range but the officials here cannot recall ever storing pears. They have stored other products which require ventilation, as well as refrigeration, similar to pears, but they separate the products with temporary partitions or curtain walls of 2 x 4 studs and sealed vapor barrier paper. The section occupied by products other than eggs are then ventilated as required.

This firm has not considered automatic controls but their engineer has been "loaned" to other firms with direct expansion systems where he has assisted and installed automatic equipment. His recommendations for a direct expansion system in connection with a smaller egg storage were to install back pressure regulating valves.—Editor, IR.

ANSWER No. 2: In answer to your questions regarding cold storage egg control, we must advise that we do not have any known installations. However, this does not seem to be a difficult problem on the surface. We would be pleased to assist your subscriber in any way possible if he would send us complete details of his system and what he wants to accomplish.—R.W.W., M-H, Inc.

ANSWER No. 3: Answer No. 2 suggests that "this does not seem to be a difficult problem on the surface." An automatic refrigeration system installed in a large wholesale cut flower storage room at Richmond, Indiana has maintained a temperature with less than ¼ degree variation for more than one year. I believe the temperature desired is 31F. The secret of success in this plant is its electronic controls used in combination with several small condensing units operating on blower type units, so spaced that the defrosting of a single unit will not materially effect the temperature in that particular locality.—H.G.V.

NAPRE

Question Box

The National Educational Committee, NAPRE, answers monthly in this column, operating problems forwarded by members. The Committee appreciates answers from the field. Both questions and answers should be addressed to Prof. H. G. Venemann, 269 Littleton St., West Lafayette, Ind.

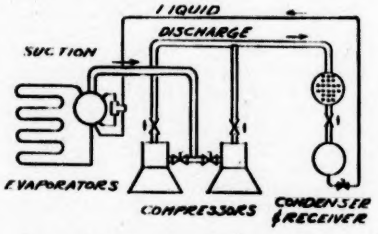
Sp. Gr., Calcium Chloride

QUESTION NO. 988: Is it true or false: That in the case of a combined ice manufacturing and cold storage plant having 0 F freezers and 33 F coolers, that a common calcium chloride brine system may be used as long as the brine is maintained as a specific gravity of 1.165?

ANSWER: False. Brine with a specific gravity of 1.165 has a freezing point of plus 1.7 degrees F. which would hardly be low enough to refrigerate a zero degree freezer room. The specific gravity would have to be approximately 1.21 to 1.22 with a freezing point of minus 20 degrees to insure against a brine cooler freeze-up with a minus 13 degrees brine supply to the house.

Increased Hardening Capacity for Ice Cream

QUESTION NO. 989. I read an article in Industrial Refrigeration, December, 1953, about rotary booster compressors. Our plant (ice cream) faces an expansion problem. I am able to get prices on building construction and additional machinery, but have to advise my employer as to whether we should drop our temperatures in the hardening rooms, or build an additional room to harden the increased production. We have plenty of storage space in our other plant, but no more hardening capacity. How could I do it, with rotaries? I believe I can accommodate the increase by dropping hardening room temperature to minus 25 F.



Existing plant consists of two 10 x 10 compressors which operate at 360 rpm, driven by two 125 hp synchronous motors. The system is a simple refrigeration system consisting of

flooded pipe coil evaporators with an accumulator in the rooms, and the usual condenser, receiver, expansion valve, etc. We operate with 0 lb. suction and minus 28 evaporator. Discharge pressure is 185 lbs. with 96F condensing. Our room storage is minus 15F, and I believe that I have a total capacity of approximately 60 tons.—R.B.H.

ANSWER: It is impossible to advise you as to what additional compressor to install until further information is given. Since you have an ice cream plant your two present compressors must be doing all of the freezing as well as the hardening work. The freezing capacity is usually the greater part of the load, requiring from 4 to 4.5 tons of refrigeration for each 100 gallons per hour of ice cream produced; whereas, the hardening of ice cream amounts to less than 30,000 Btu per 100 gallons of ice cream. If this is done in a blast freezer in one hour's time it takes from 2½ to 3 tons capacity; but, if it is done in a hardening room in a minimum of 24 hours, it takes less than 1/10 ton capacity per 100 gallons of ice cream produced.

One of the questions involved therefore is the maximum capacity of your ice cream freezers in gallons per hour. This will determine the running time of your compressors. This work can easily be done with ammonia evaporating temperature of minus 10F, corresponding to a pressure of 9 psig. On the other hand to obtain an evaporating temperature of minus 40F in the hardening room coils you would require a suction pressure of 8.7 in. Hg, vacuum.

At minus 40F each of your 10 x 10 compressors would have a capacity of 16.5 tons; at minus 28F (0 psig) 28.3 tons, and at minus 10F (9 psig) 48.5 tons.

There is no doubt but that you would reduce your power cost by doing your hardening room work on a separate compressor independent of the compressor working on the ice cream freezers, and there is no doubt that this extremely low temperature work could be done more economically by two-stage compression.

It is not clear however what displacement compressor you should have to do all of the low temperature work, or whether a booster compressor should be tied in with either or both of your present machines. The advantages of two stage compression with liquid intercooling are well known and have been discussed in previous issues of ICE AND REFRIGERATION, but to balance minus 40F temperature loads against the minus 10F temperature loads requires first a knowledge of what those loads are. The following additional data would help greatly in answering your problem.

(a) Capacity of ice cream freezer in gallons per hour.

(b) Maximum output of ice cream in gallons per day.

(c) Size of hardening room, length, width, height.

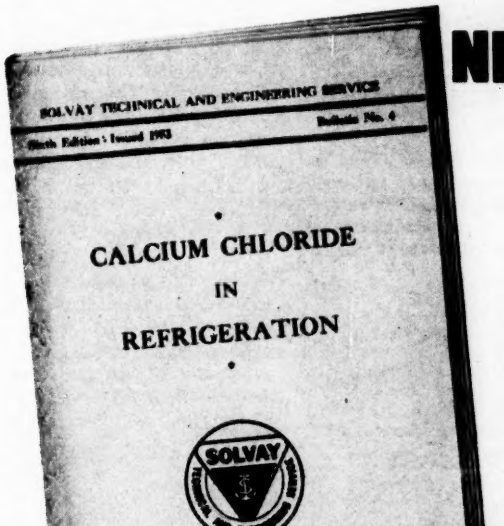
(d) Time required to harden ice cream in hours.

(e) Estimated tons capacity of other refrigeration loads.—H.G.V.

Compressor Operates With Superheat

QUESTION NO. 990: What could be causing my high-stage compressor to operate with approximately 50F superheat, almost 30F above recommended safe operating practice? Discharge pressure from the high-stage compressor sometimes exceeds 200 psig and temperatures are over 300F when suction pressure from the liquid intercooler is 30 psig.

Booster discharge is passed through water cooled desuperheater, and then into a 36-in. diam. x 10 ft. vertical liquid inter-cooler through the top, although this 8-in. line runs down the interior of the cooler where it tees into a perforated line under the liquid level. Discharge from the booster averages 250F and from the water cooler desuperheater at approximately 125F.



It's Yours—At No Cost or Obligation

SEND FOR YOUR FREE BOOK TODAY

NEW REVISED EDITION!

The Most Complete, Informative Book in the Industry on:

Preparation—Strengthening—Maintenance of

CALCIUM CHLORIDE REFRIGERATION BRINE

LATEST EDITION CONTAINS:

- Most advanced, up-to-date tables
- New, additional information
- More complete data

SOLVAY Calcium Chloride

SOLVAY PROCESS DIVISION
61 Broadway, New York 6, N. Y.
Allied Chemical & Dye Corporation

Gentlemen:

Please send me AT NO COST OR OBLIGATION your FREE BOOKLET "Calcium Chloride in Refrigeration."

Name_____

Position_____

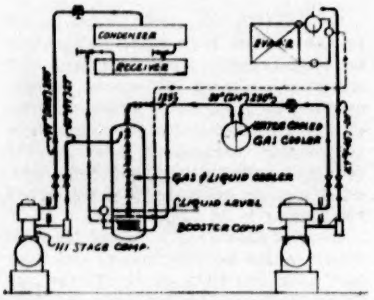
Company_____

Address_____

56-3

It appears that I am going to burn up the high stage compressor. Can you help me? (Degrees in parenthesis on the sketch are what I believe should be my operating temperatures.)—J.F.

ANSWER No. 1: Since the plant was nearby, the writer paid the Chief a visit. It is believed that the 8 in. line from the booster had sufficient surface to reheat gas that had been cooled by passing through the liquid. This is causing the superheat at the high stage compressor.



Recommended piping practice for liquid inter-coolers is to bring the booster discharge piping into the vessel from 1 to 6 in. below the normal liquid level, keeping this line outside the vessel to that point.

The contractor had piped the job through the top originally "to save low temperature insulation costs." Actually, except for a foot or two from the vessel, no *low-temperature* insulation would be needed.—E.R.

New Questions

Hp Calculations for Horizontal Two-Stage

QUESTION NO. 991: Could you give me a procedure, set of rules or formula to follow in calculating the tons of refrigeration being developed by a two-stage horizontal reciprocating ammonia compressor? Specifically I am referring to a chart published on page 218, Principles of Refrigeration, 3rd edition (Page 189, 3rd edition revised). I can figure the tonnage accomplished by the low pressure cylinder, but when it comes to high pressure, I am stuck.—J.W.N.

Proper Evaporator Feed

QUESTION NO. 992: Which is better design and operation, to feed evaporator coils from top or bottom? (a) In a wall hung pipe coil with NH_3 refrigerant? (b) In a ceiling-hung diffuser unit with F-12? (c) In a tub-type freezer cabinet with copper tube soldered to inner steel tub? —J.S., Milwaukee.

Compressor Bhp from Panel Board Instruments

QUESTION NO. 933: How may I determine the amount of brake horsepower of my reciprocating compressor? Would a practical means of determining the brake horsepower utilize a watt meter, or a volt meter and ammeter?—W.L.T.

NH_3 Liquid Pump Vapor Binds

QUESTION NO. 994: Our plant has an ammonia receiver installed 18 inches off the floor in an old engine room over a buried exhaust steam line, still in use, which keeps the floor at a temperature of 125-150 degree F. The accumulator and liquid suction line are covered with brine thickness cork. The horizontal run of the liquid suction, which is 20 feet, pitches to the pump 18 inches and then drops the final 10 feet to a single stage pump. This installation worked satisfactorily up to 150 psig. discharge pressure. Above this pressure, flashing caused loss of suction.

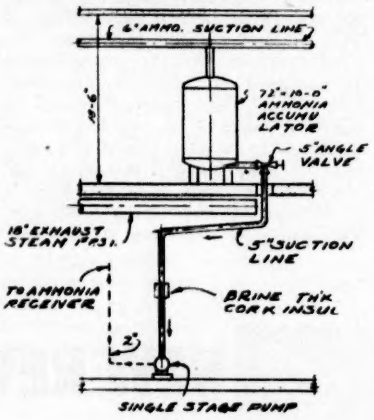


Fig. 1

We converted the liquid pump to two stage as it was necessary at times to pump against a discharge pressure of 225 psig. (Fig. 2) However, flashing between first and second stage

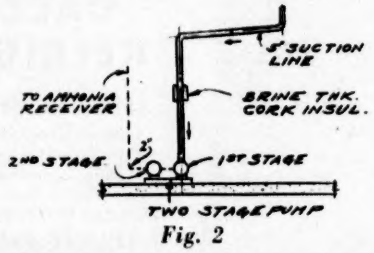


Fig. 2

created more volume of vapor and liquid than the second stage could handle. The pressure then built up between stages and when it reached approximately 150 psig., the first stage lost suction, so we are right back where we started. What would your recommendations be? — A.L., Pittsburgh.

Cooling Concrete Mix

QUESTION NO. 995: Will you please furnish information as to the method of calculating the cooling load for cooling one cubic yard of concrete as placed in dams or foundations? As concrete sets or cures is there chemical heat developed and what is the specific heat of concrete? —J.W.B.

New Orleans Host to Fall Convention

THE 45th annual NAPRE convention will be held in New Orleans, November 2 through 4, it was announced in January by Leo J. Vivien, National President. Louisiana Chapter No. 2, located in that city, will be the convention host. Site of the assembly will be the Roosevelt Hotel, location of two previous NAPRE conventions in Louisiana.

Louisiana Chapter No. 2 is now the largest chapter in NAPRE, with over 350 members. They were successful in nosing out California Chapter No. 2, Los Angeles, by one member in the 1953 contest. Frank L. Chase, a national director, is the Chapter President.

Wegener Appointed Convention Chairman

THE president of New Orleans Chapter, Frank Chase, with the approval of the National President, Leo J. Vivien, appointed Addison E. Wegener as General Arrangements Chairman for the 45th Annual Convention at which Louisiana Chapter No. 2 will be host. The Convention will be held November 2-4 at the Roosevelt Hotel, New Orleans, La.

During January the National Secretary journeyed to New Orleans to confer with President Vivien, Director Chase, and Mr. Wegener, a past national president, concerning convention arrangements. John B. Bryner, also a past national president and chief engineer of the Roosevelt Hotel, figured prominently in the convention negotiations. Sessions will be held in the University Room of the Hotel with the annual banquet in the Main Ballroom. Provisions have been made for educational exhibits to augment the annual refrigeration program.

Social events planned for the meeting include the traditional informal get-together Tuesday evening, the Chapter Party Wednesday evening, and the annual banquet Thursday evening, the usual convention finale. Arrangements are being made for the annual Board of Directors meeting to precede the convention, probably at noon, Monday, November 1.

Garlinger Re-elected to Port Engineers

AN NAPRE member, Marshall T. J. Garlinger, veteran marine engineer of two World Wars, has been reelected president of the Society of Port Engineers of San Francisco of 1954. Mr. Garlinger, a native

Marshall T. J. Garlinger

of San Jose, Calif., and a mechanical engineering graduate of Santa Clara University is with the Technical Design Section, US Navy Military Sea Transportation Service, Pacific Area, San Francisco.

Mr. Garlinger is a past president and past chairman of the board of directors, California Chapter No. 1. He is also a member of San Francisco Marine Exchange, National Association of Corrosion Engineers, US Naval Institute, and the Society of Naval Architects and Marine Engineers.

New Frozen Food Plant

TO MEET the growing demand for Pictsweet frozen foods, plans for construction of a large, modern freezing plant in San Jose, has been announced by E. J. Watson, president of Pictsweet Foods, Inc.; Glenn Dodson, president of Security Warehouse & Cold Storage Co.; and Clifford Swenson of Carl N. Swenson Co. Inc., contractors.

The project is a joint undertaking by Pictsweet, Security and Carl N. Swenson Co., Inc., with Security starting the first of a three-unit cold storage warehouse on the adjoining tract to accommodate the output of the new Pictsweet plant and for larger capacity for increasing freezer storage demand in the area. Construction of both units will begin immediately.

Klamath Cold Storage Sold

THE interest of Collier and Ross Ragland in the Tulelake Cold Storage Company, Klamath Falls, Oregon, has been purchased by George A. Myers associated with A. M. Collier in operation of the Klamath Ice and Storage Company. He will be associated with a son, James L. Myers and R. M. Smith, Percy Murray and Karl Gentry.

Push Safety More in 1954

THE National Safety Council's Ice and Cold Storage Division has launched one of the most impressive safety campaigns this Industry has seen. A committee consisting of W. F. (Bill) Leonard, Jr., Southland Corporation, Dallas; Sloan Childers, Southwest Ice & Dairy Products Company, Oklahoma City; and H. T. McDermott, INDUSTRIAL REFRIGERATION, Chicago, has outlined and set out to make the Ice Industry safety minded.

In 1954 the committee plans to collect safety information on which to build a safety-conscious industry; to assemble experiences, plans and ideas for launching a sound program of selling the importance of safety to every iceman; and finally, to make every manager and every ice plant employee safety-conscious all the time.

Ohio Ice Plant Sold

THE Van Wert Ice & Supply Company, Van Wert, Ohio, has been sold to Eli Rager, Payne, Ohio. Carl Linser of West Main Street, will be the manager. William Smith, owner and manager of the company for the past eight years is moving to Columbus where he has accepted a position with the Union Service Corp.

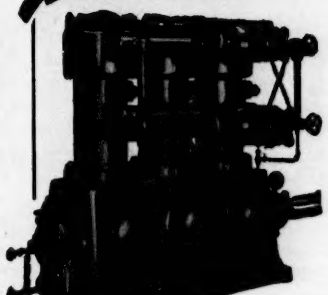
The Case of the Contented Engineer

By Howe . . . The World's Chiller

John Q. Engineer was pleased with his old refrigeration system. Been giving him pretty good service . . . off and on. Of course, the cost of operating it was going up, but what expense wasn't? Had some downtime lately, but then you have to expect that, too!

Then one day, a Howe "private eye" detected the trap that "J. Q." was walking into, and pointed out those unseen losses that were robbing him of his real profits. He showed him how to cut the risk of spoilage, assure better production, keep his products at their perfection peak. By providing exact temperature and humidity control at *all* times with Howe tested equipment, "J. Q." soon realized his obsolete, inefficient system had been robbing him *cold.*

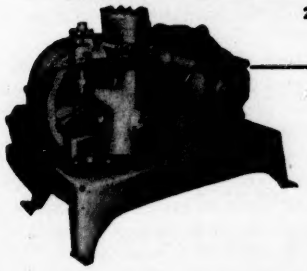
He also realized that his new Howe kept running longer, with less trouble. "They're designed for that from the start, backed by 42 years' specialization," said the "private eye," departing for his next case.



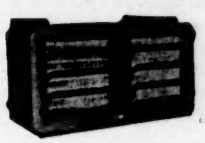
HOWE ICE MACHINE CO.

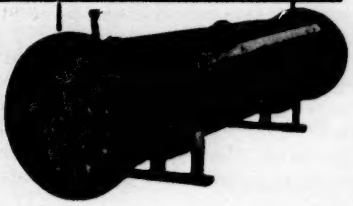
2829 Montrose Ave., Chicago 18, Ill., Cable: HIMCO • Chicago

DISTRIBUTORS IN PRINCIPAL CITIES



CONSULT HOWE on all your refrigeration problems. Since 1912 manufacturers of ammonia compressors, condensers, coolers, fin coils, locker freezing units, air conditioning (cooling) equipment. Immediate delivery!





Frozen Food Packers Review Records And Progress at Annual Convention

TECHNOLOGICAL improvements, increased production, better distribution methods and more retail outlets have brought frozen food prices down while most other prices have been going up, M. K. Spiegl, president of National Association of Frozen Food Packers, declared at the National Frozen Food Convention, held in New York, January 31-February 3.

Frozen food prices have dropped more than 15 percent lower than they were in 1947-49 period, Mr. Spiegl declared. "The consumer is getting the benefit of the huge advances made by our industry."

Mr. Spiegl pointed out that in the last year frozen vegetables cost the consumer about 22 percent less than they did in the 1947-49 period. Prices of frozen fruits and juices have dropped 9 percent in the same period, Mr. Spiegl said. Frozen juice concentrates alone have seen a reduction of 30 percent to the consumer, he asserted.

In 1953 the frozen food industry for the first time passed the billion-dollar mark with sales at retail of $1,200,000,000 and a total of 1,434 processors as against 1,328 the year before. The industry sold 3,380,000,000 pounds in 1953 as against 2,890,000,000 in 1952. These were the growth figures presented at the opening session of the Convention.

Some three score packers and equipment concerns had exhibits. About 250 packers were represented, along with 154 brokers, sixty suppliers and fifty-five warehousers.

Problems of Industry

As revealed in speeches and panel discussions, the chief problems of the industry were linked to rapid growth. Sam Barton, president of the Market Research Corporation, reported that 64 percent of all retail stores, doing 91 percent of the nation's retail food business, were now equipped with frozen food cabinets. On the West Coast the percentage was 90.

Mr. Barton said that though three-quarters of American families had bought frozen foods last year, the major market was still in the higher income brackets.

This report contrasted with other reports that frozen foods, particularly vegetables, were selling for less than their canned counterparts. George A. Gardella of Detroit, for instance, asserted that the distributing company bearing his name was selling frozen peas for less than the top lines of canned peas. He, like other speakers, complained of the practice of price cutting in the industry.

Transport Problems

At a transportation panel it became evident that the industry was not satisfied with either the rail or the road service it was getting. It was reported that the railroads, though making excellent progress in providing equipment to handle frozen foods, had so far refused to put the rates for it on a competitive basis with the rates for canned and other processed foods.

In general, it was noted, the railroads are getting the long-haul business and the truckers the short-haul. This despite the fact that fewer trucks proportionately have the mechanical refrigeration equipment required to keep frozen foods below zero temperature in transit.

E. M. Angell, vice president of Stokely Foods, Inc., asserted that lower rail rates were justified because in recent years damage claims against the railroads for frozen foods were lower than those of all other foods.

Citrus Fruits

In a panel on citrus fruits, F. R. Wilcox of Sunkist Growers, Inc., said that for the first time lemons had caught up with the phenomenal growth of the orange business. Freezing concentrate and other processes, he said, for the first time have absorbed into normal channels the usual surplus of California lemons.

At the same panel John Fox, president of the Minute Maid Corporation, assured the dealers that there was no prospect of a shortage of the Florida orange product.

"I've been down there just recently," he said. "The plantings since the war make an ample supply definite for as long as we can see. Today orange juice is running out of Florida's ears."

Deplores Price Cutting

"Despite a continuing favorable growth trend in volume, packers of frozen foods are committing profit suicide by self-strangulation," Marvin Bower, partner of McKinsey & Co., management consultants, declared.

"Price cutting to win a share of the market and a place in the freezer cabinet is keeping the industry from earning the profit reward to which it is entitled, considering the major contribution it is making to the consumer's table."

"Low price," Mr. Bower continued, "is a competitive weapon readily available to everyone. With many frozen food products losing their distinctiveness on the consumer's table, many packers are simply trying to buy their way into selected markets. This is a game that anyone can play for short periods, so profit returns are constantly being driven down.

"Unfortunately, there is no easy way to higher profits for frozen food packers," Mr. Bower cautioned. "They will simply have to depend on lowering processing costs; developing better cost data; stepping up effectiveness in marketing strategy and selling efforts; and other management methods that produce profits in any industry."

"On a grander scale, the industry has opportunities to build profit leadership for a few companies through mergers that do not violate the Clayton Act," Mr. Bower told the food packers. "With a smaller number of stronger companies, there will be a greater opportunity for price leadership that potential price cutters will respect."

Prepared Frozen Foods

Prepared frozen foods, those made from a combination of products and ready to be warmed and eaten, have the greatest sales potential in the frozen foods industry, George L. Mentley, general sales manager, Birds Eye division, said. Mr. Mentley added that more than 30 percent of frozen food sales on the West Coast are from prepared products and he predicted a similar development in the East.

In a panel discussion of the future of prepared frozen foods, Patsy D'Agostino, president, D'Agostino Bros. Food Markets, said that prepared products have the greatest possibilities for retailers. "They can become the items which even up the retailer's profit on the frozen food line," he said.

However, Mr. D'Agostino warned, it is up to the packers to merchandise the new products to the consumer before introducing them. "It is not enough to have the retailer stock the new items in his display cases. Mrs. Consumer must be pre-sold by advertising and merchandising," he said.

(Continued on page 49)

Florida Ice Industry Safety Program

STARTING in December, 1953 and continuing throughout 1954 the ice industry in Florida is engaging in a safety campaign for the purpose of reducing injuries and cutting down accident costs. The program is being directed by The Florida Industrial Commission which conducted a survey of safety and accident records in Florida ice plants during December. This survey showed that the frequency accident rate is almost twice the national average. And injuries, in addition to being more frequent, are also more severe than in the United States as a whole. Fifty-two of the 133 plants surveyed had no injuries. At the other extreme, 16 plants had an injury rate of over 300, and one had an injury rate of 710.

The program, which will consist of twelve monthly safety releases and concentrated effort by field representatives, will run throughout the year 1954. It will review the reasons why ice plant accidents are high, show the benefits of the program, and specific step-by-step instructions for carrying the program along. The Department of Industrial Safety will furnish a flow chart showing ice plant operations and their dangers; monthly safety materials, posters, bulletins, inspection charts and accident facts, and assistance of a professional safety man.

It is expected that this program will help to reduce and eliminate accidents and also reduce the increasing insurance rate.

The Florida Ice Association will cosponsor with the Florida Industrial Commission four safety regional meetings this year and will present safety awards at the state convention in October.

Kansas-Oklahoma Joint Ice Association Conventions

THE annual joint conventions of the Oklahoma and Kansas Associations of ice industries was held at Oklahoma City January 17-19, 1954.

Paul H. Andres, newly elected president of the National Association of Ice Industries was one of the outstanding speakers and Mrs. Johnston Murray, Oklahoma's first lady, entertained the ladies at a tea, in the Governor's mansion on Monday afternoon, January 18.

Sharing speaker's honors with Mr. Andres, was Guy W. Jacobs, Executive Secretary of the National Association of Ice Industries. The annual dinner dance was held in the Venetian Room of the Skirvan Hotel Monday evening.

The proposed new Turnpikes were endorsed by the Oklahoma group. Directors unanimously approved the resolution of giving the endorsement and urged associate members to help pass measures authorizing the new roads.

Thomas H. Carroll, manager of the City Ice Delivery Company, Wichita, Kansas was elected president of the Kansas Association.

The 1955 joint convention will be held in Wichita at a date to be decided later.

Burge Ice Machine Fire

A FIRE in the floors above the premises occupied for over 40 years by the Burge Ice Machine Co., 218 N. Jefferson St. Chicago, Ill., caused considerable damage to stock, furniture and fixtures. Fortunately current records and all engineering drawings were virtually undamaged and by noon on the day of the fire. temporary quarters were in operation four doors south of the original location.

The ARMSTRONG *forged steel* PURGER

KEEPS REFRIGERANT SYSTEMS FREE OF NON-CONDENSABLE GAS

- Reduces Head Pressure
- Saves Power
- Saves Refrigerant
- Saves Work
- Increases Capacity
- Saves Water

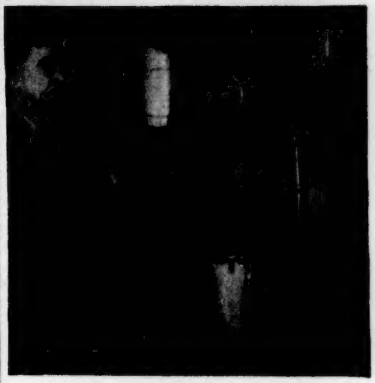
EACH four pounds excess head pressure caused by air or other non-condensables increases compressor load and reduces its capacity by approximately 1%; increasing power cost about 2%.

An Armstrong Purger stops such costly operation. It is a simple, dependable mechanism which eliminates air from refrigerant, bringing you these benefits:

1. Reduced power costs
2. Labor and time saved—no manual purging
3. Full capacity operation
4. Reduced wear on motor and compressor
5. Excessive pressure stresses reduced
6. Helps prevent "ammonia" explosions

Free Bulletin No. 221 tells how you can save with an Armstrong Purger; sizes, prices and selection data given. Send today.

LIQUID SEALS



ARMSTRONG LIQUID SEALS are easily installed. They keep high pressure refrigerant gas out of the evaporator if the liquid level in the receiver drops below the outlet pipe. Proven Armstrong inverted bucket design means long dependable performance. For pressures to 600 lbs.

FREE Liquid Seal Bulletin, No. 241, giving complete data and prices. Send now.

PURGERS AND LIQUID SEALS ARE GUARANTEED TO SATISFY

ARMSTRONG MACHINE WORKS 860 Maple Street, Three Rivers, Michigan

Merchandising Progress Outlined at Ice Convention

OF THE 128,000 railroad refrigerator cars in use, almost all of them are cooled by ice, it was reported at the 29th annual convention of the Missouri Valley Ice Manufacturers Association January 11-12.

C. P. Austin, director of research and marketing for the National Association of Ice Industries in Washington, told approximately 120 persons attending of the changes he feels the industry must make to compete with its competition effectively.

"The future of the ice industry lies in the ability to find new markets, to improve the brand of selling to the markets we have, and to educate the public to the services we provide," he said.

In an earlier speech, Harold Margolin, president of the Ice Service Company at Kansas City, reported on proceedings at the national convention in Washington.

"Many new methods of distributing and packaging ice, with the emphasis on convenience to the customer, will be seen in the near future," he said. "Our aims are to make cubes and other forms of ice available for everyone to buy and use."

National Ice Association Moves Into New Offices

THE National Association of Ice Industries is now pleasantly housed on the third floor of the Otis Building at 810 - 18th Street, N.W., Washington, D.C., having moved from 1706 L Street, N.W., where the association headquarters has been located for several years.

In making the move the association avoided a substantial rent increase and, of more importance, now has better space. The new location is less than four blocks from the former and it is still near the hotels, government offices, public transportation and postoffice. As usual a cordial invitation has been extended to members and friends of the Association to drop in for a visit at any time.

Ice Plant Fire

FIRE recently caused $20,000 damage to the one-story building of the City Ice and Coal Company, Scottsboro, Alabama. Unable to save the building because of the headway gained before the fire was discovered, firemen stood guard for six hours to prevent the blaze from spreading to adjacent buildings.

Ice Company Gets Safety Award

BECAUSE of an outstanding safety record for 1953 the Ogden, Utah, Ice plant of Pacific Fruit Express was awarded the 1953 Safety Plaque organization by K. V. Plummer, San Francisco, vice-president and general manager of the company.

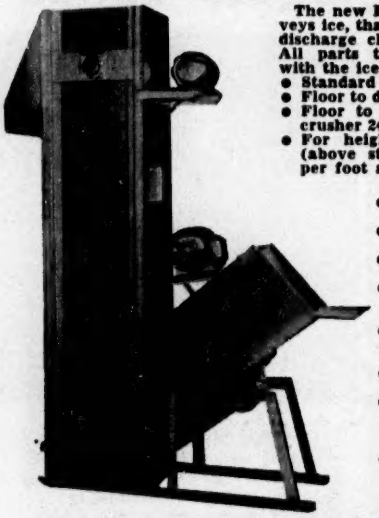
Under the supervision of P. F. Jones, plant manager, the Ogden plant worked a total of 211,781 man hours last year without an accident. An average of 125 men were employed monthly, who manufactured and placed in refrigerator cars 80,805 tons of ice during the year. The storage plant holds 15,800 tons of ice, with a daily manufacture of 375 tons.

Natural Ice In Maine

A CREW of 50 men finished the job of cutting ice on upper Kenduskeag stream for Getchell Brothers, Inc., ice dealers in Bangor, Maine. The ice which is stored in the company's ice house near the cutting site will be sold to supplement the supply of ice manufactured by the Getchell company. The ice was ten inches thick, the heaviest it has been in the past three years.

BATEMAN Crushed Ice Elevator

WILL DELIVER APPROX. 10 TONS OF ICE PER HOUR



The new Bateman Elevator conveys ice, that has been crushed, to discharge chute for bagging, etc. All parts that come in contact with the ice are galvanized.

- Standard height 7' 6".
- Floor to discharge chute 72".
- Floor to top of hopper under crusher 24".
- For heights taller than 7' 6" (above standard height) $25.00 per foot additional.

FEATURES:

- V-belt drive from motor to gear box.
- Gears are enclosed and run in grease.
- ½ HP. motor to drive elevator.
- Top and bottom sprocket shafts run on roller bearings.
- Connecting chains for cups are of steel and galvanized.
- Cups do not ride sides of elevator.
- Take-up slack on chain is outside of housing for easy adjustment.
- At bottom of housing, pull-out pan provides easy cleaning of any left over crushed ice.

The Bateman Elevator can be ordered without crusher, as the Bateman Elevator will work with any crusher.

Price of Elevator, less motor $450.00
Elevator with Monarch Crusher, less motor $685.00

Monarch Crusher takes a one HP. motor. (Motors at prevailing prices.)

Bateman

Ice Processing Equipment

Write For Full Information

MINERAL WELLS, TEXAS

SHANK

AMMONIA VALVES AND REFRIGERATION PRODUCTS

3-WAY DUAL SHUT-OFF VALVE

For use where Refrigeration Codes require dual relief valve installations. Stainless steel stem. Indicator plate on hand wheel shows position of valve shut off. Completely rustproofed.

RELIEF VALVES

For Ammonia and Freon. One Piece body design—rustproof finish. Internal construction—stainless steel—will not corrode. Positive relief action. Pressures from 75 to 400 lbs.

See your jobber—or write us for prices.

CYRUS SHANK CO.

4650 W. 12th Place, Chicago 50, Ill.

National Ice Program to be Localized

At its mid-winter meeting, February 2, the Executive Committee of the National Association of Ice Industries decided that during 1954 the National program would be taken to the members. Each NAII Division will have at least one meeting and the larger Divisions will have two.

President Paul Andres gave an indication of the program in his acceptance of the NAII Presidency at the National Convention in November. He said that during the Convention in Washington, he was deeply impressed with the idea of how much greater and how much more valuable the National Association's services to the Industry could be if more members could attend the inspiring sessions and would actively participate in the fact-packed discussion meetings.

In summarizing the action of the Executive Committee, President Andres pointed out that in his opinion, the Association's most important purpose is to serve as a focal point from which new methods, new uses, and successful operating practices within the Industry are created for and disseminated to the membership. In the recent past, he said, the Association has done a splendid job of providing advertising, merchandising, marketing, public relations and research services and materials on a more or less national basis, and with the exception of advertising, these activities are continuing on a reduced but sound scale.

All of the activities of the Association and developments within the Industry are adequately recapitulated each year at the National Convention. The chief difficulty with this program, however, is that only a small part of the total membership and a much smaller percentage of the entire Industry get this first-hand information. "We're going to overcome this by localizing the program. . . . We're going to take the National to the members," he said.

The meetings will enable the officers of the Association and the members of its staff to find out what the members want. It will permit members who have had little or no influence in planning the Association's program to contribute their thinking to it. The meetings will provide a clearing-house for exchanging Ice information on a local basis. They will give members, and non-members, an opportunity to discuss local problems with other people who have identical problems, or with people who may have already solved them. Finally, the staff, through its participation in these conferences, could build up a tremendous amount of valuable information for distribution at other conferences in other sections and to the national membership.

Plans call for having a member of the Executive Committee or the Board of Directors serve as moderator at each conference. All meetings are to be round-table discussions. All NAII members and non-members in the area will be urged to attend. Two members of the Washington staff will attend each session.

President Andres cautioned that, "It should be clearly understood by everyone that these conferences are not intended to conflict in any way with Unit Association conventions or programs. Instead, the aim is to stimulate interest in both Unit and National Association activities. Everyone will become better informed on changes in equipment, changes in services, and developments within the Industry. Certainly, this is the basis on which stronger associations are built.

90% OF YOUR CUSTOMERS WANT TO BUY
PROCESSED ICE

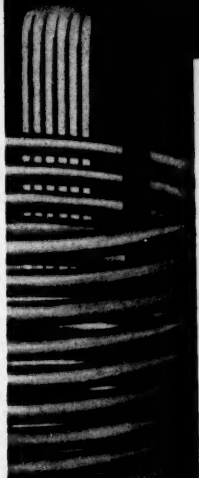
Make cubed or crushed ice available through the POLAR Processed ICE VENDOR.

- A Compact Unit—Cabinet only 4′ 2″ wide x 9′ long.
- Operates at low cost. Small space refrigerated.
- Carries Large Pay Loads. Belt capacity: 40 ten-pound bags; Storage: 200 ten-pound bags.

Write Today—for complete details on POLAR Processed Ice Vendors.

REFRIGERATION ENGINEERING CO.
MONTGOMERY, MINNESOTA

PIPE BENDING EXPERTS



COILS, WELDED HEADERS, SPECIAL PIPE BENDS, ETC.

The tougher the job, the better! Specialists in custom bending in any form of any metal up to 6-inch extra heavy—even stainless steel! Our skilled metal-workers, using *proper* equipment, can fabricate to your exact specifications. Complete welding facilities. Over 25 years' "know-how" assures fine quality workmanship.

We'll gladly quote on your next job.

CHICAGO NIPPLE MFG. CO.
1997 CLYBOURN AVE., CHICAGO 14, ILL.

Big AWA-NARW Convention Planned

OVER 400 reservations have already been received for the American Warehousemen's Association 63rd annual meeting, according to John H. Mercer, Jr., Convention Chairman and President of the Mercer-Fussell Company, Miami, Florida. This year's meeting, which will be held at Boca Raton, Florida, April 25-29, is expected to be one of the best in AWA history, a rare combination of profit-making business sessions and outstanding recreational facilities.

Horace C. Avery, President of the Union Terminal Warehouse Company, Jacksonville, Florida, has been named honorary convention chairman. Mr. Avery, a past AWA General President (1942-43), has long advocated Florida as a meeting place for one of the Association's annual conventions and is working hard to make this year's meeting an unusual success.

The meeting will be a joint affair with the National Association of Refrigerated Warehouses and the AWA Merchandise Division participating. In addition, the Refrigeration Research Foundation and NARW will hold two joint sessions to discuss important and relatively new developments in the field of perishable food preservation. Two well known scientists will be on hand to give delegates authoritative opinions on new developments.

Dr. Bernard E. Proctor of the Massachusetts Institute of Technology will discuss irradiation of foods as it relates to the future of the refrigerated warehousing industry and Edward Simons of San Francisco, Calif., will discuss the new jet-air freezing process.

New profit making ideas for increasing warehouse efficiency, it is expected will be produced by a warehouse operations display at the convention. Warehousemen are asked to cooperate by sending photos of new plants completed or of the cooler room converted to freezer. Any ideas of better stacking methods or a more efficient delivery form also are solicited.

Panel Sessions

NARW will feature the popular panel type sessions to give each delegate a chance to air his own individual problems. Subjects tentatively being considered include maintenance, costs, materials handling, insurance, and warehouse losses through damage and pilferage.

A highlight of the NARW sessions will be the awarding of safety certificates to individual plants who have gone one year, any consecutive 365 day period, without a lost time industrial accident. Only those records established after January 1, 1953, will count. The Safety Award Program was developed and sponsored by the NARW Safety Committee under the chairmanship of A. R. Carstensen, president of the Crystal Ice and Cold Storage Company, Sacramento, California, as part of its over-all survey of safety conditions within the industry.

Social Activities

The President's Reception and Dinner Wednesday night will highlight social activities. A Get Acquainted Party, sponsored by warehousemen in the Florida area will open convention festivities Sunday evening and the Family Party—a steak fry on the beach—will be held Tuesday evening. The popular "Farewell Luncheon" will be held Thursday noon.

In addition, the Boca Raton Hotel and Club will provide AWA delegates with the ultimate in recreation and relaxation, including golf, swimming, tennis, water skiing and fishing among others. The Ladies program is rounding out with a host of activities being planned, including a boat trip through the Inland Waterway.

Sport clothes will be the order of the day for men and women. With temperatures ranging from 70 to 78 degrees, the climate will be perfect.

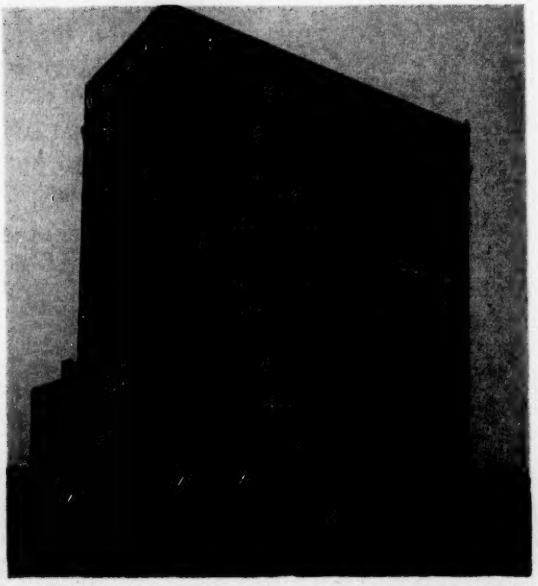
Refrigerated Warehousing In National Publicity

THE February issue of Nation's Business, official publication of the U. S. Chamber of Commerce, carries a full-length article on the refrigerated warehousing industry. Written by Sid Shalett with the cooperation of the NARW Washington Office, the article fully illustrates the Industry's over-all progress and outlines the vital part it plays in the nation's food economy.—Cold Facts.

New Poultry Packing Company

PERMIT to build a $15,000 addition to a building in a semi-residential district along the Frankston Highway has been granted by the Board of Adjustment of Jacksonville, Texas to Frank Kessler. The building to be expanded formerly was used as a poultry processing plant. It will be doubled in size and Mr. Kessler will turn over facilities to an established firm that is moving to Jacksonville from another city to serve its East Texas market area.

Cold Storage Building Shows Icy Girdle



Jack Frost had competition on January 15 in Chicago. An unusual sight of an 8-story high ice coating around the North American Cold Storage Company building just out of Chicago's Loop startled many business personnel and made front page print in the Chicago newspapers. A week of near-zero temperatures was suddenly followed by a thaw and very high humidities. Apparently the temperature gradient through the insulation and masonry walls between the sub-zero storage rooms and building exterior, was at the freezing point on the outer wall surfaces. Moisture in the highly humid air condensed out and froze into an icy sheathing.

Quaker City Goes To Frozen Foods Exclusively

IN a recent letter, Quaker City Cold Storage Company, Inc., of Philadelphia announced to their customers, one and all apparently, that they have "decided to confine ourselves, generally speaking, to the storage of only those frozen food stuffs that are frozen or are to be frozen, and which include berries, dairy products, fish, fruits, meats, poultry, vegetables, etc." A long-range changeover from partial cooler to almost entirely freezer space was the reason for this public announcement which includes the statement that " we think we can best serve the interests of the people of the Philadelphia area by so doing."—Cold Facts

Turkey Production Limited

RECOMMENDATIONS for a substantial reduction in the production of turkeys from producers' intentions reported to the U. S. Department of Agriculture were made by the Turkey Industry Advisory Committee meeting at Milwaukee, Wis., on January 16.

The U. S. Department of Agriculture issued a report on January 15 of producers' intentions to produce six percent more heavy breed turkeys this year than last, and to increase the production of light breeds by nine percent. On the basis of this and other information, the Committee recommended that the production of heavy breeds be "no larger than in 1953", and that the production of light breeds be "no more than can be profitably marketed through normal commercial channels."

The Committee said that growers' intentions to increase production, as reported by the Department, were more than substantiated by the Department's January 13 special turkey hatchery report. This report showed that in seven leading turkey states on January 1 there were 110 percent more light breed eggs and 15 percent more heavy breed eggs in incubators than a year earlier.

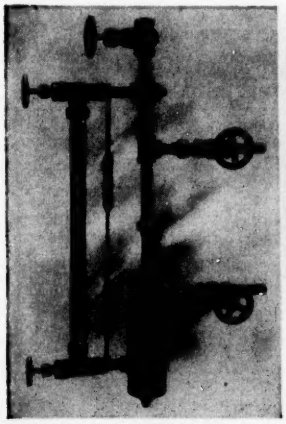
The Committee also pointed out that the stocks of turkeys in cold storage are large. Although smaller than the total stocks of a year ago, the January 1, 1954, holdings were about equivalent to that part of the year-earlier stocks which were available for commercial sale after allowance was made for contracts to the Government's purchase program. At the same time, official reports and estimates of breeder turkeys tested and to be tested show possibilities for a substantial increase in production of both heavy and light breed turkeys this year.

Tax Amortization Extended

A BILL has been introduced by Rep. King of Pennsylvania (H. R. 7382) which would extend to "fruit and vegetable storage facilities" the same tax amortization deduction now granted grain storage facilities. As written the bill would apply only to cold storage plants storing fruits and vegetables produced by the owner of the plant. Chairman Jerry Johnson of the Legislative Committee NARW has the bill under study.—Cold Facts.

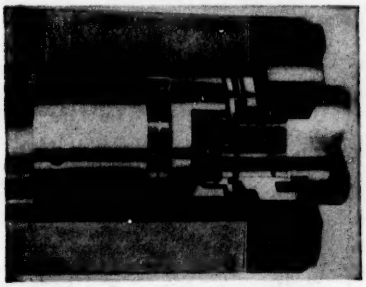
Fire Damages Cold Storage

FIRE at the Midwest Cold Storage and Ice Corp., plant, Kansas City, Kans., caused damage to the building estimated at $1500.00 and to the contents estimated at $300.00. The blaze in a freezer building apparently started from an overheated gas heater and spread to the roof.



Oil-type Liquid-Level Indicators Have Many Applications

Coils Are Made to Standard Designs or to Suit Your Special Needs



Patented Flexo-Seals, for Compressor Shafts, Hold Vacuum or Pressure without Adjustment

Frick Oil Provides Extra Protection for Your Compressors

Protect Your Investment with FRICK

Refrigeration Auxiliaries and Supplies

Whether you need a single part or a complete plant overhaul, you can get up-to-the minute equipment and helpful service from the nearest Frick man.

Write for Bulletin 195: This illustrates all kinds of refrigerating equipment that will aid you in operating your system more efficiently.

DEPENDABLE REFRIGERATION SINCE 1882

FRICK CO.

WAYNESBORO, PENNA. U.S.A.

Also Builders of Power Farming and Sawmill Machinery

January 31 Cold Storage Holdings

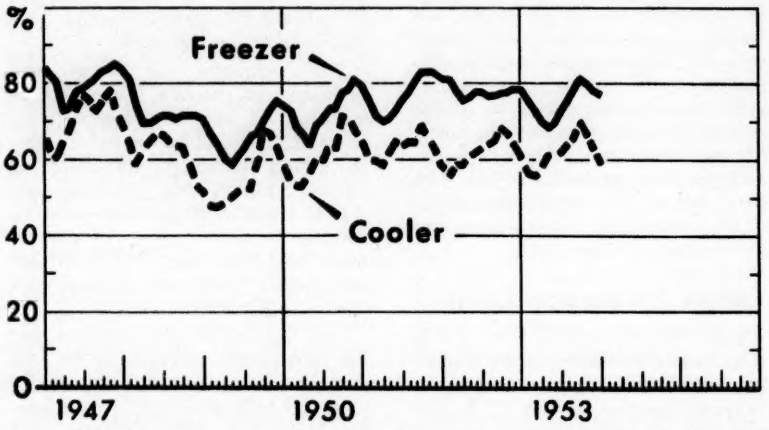
AN ALL-TIME record net withdrawal of frozen vegetable stocks was reported during January according to reports received by the Agricultural Marketing Service. The 75 million pound reduction left 629 million pounds of frozen vegetables in storage on January 31. The seasonal net reduction in frozen fruit stocks, 30 million pounds, was a record high for the month. Orange concentrate holdings were increased to 18 million gallons. Butter stocks were up to 294 million pounds but American Cheddar cheese stocks were down by 6 million pounds to 395 million pounds. Holdings of frozen beef were down to 218 million pounds but frozen pork stocks increased to almost 249 million pounds. All meats in storage amounted to 759 million pounds or about one-fourth less than last year's stocks and about one-fifth less than average holdings for January 31.

Utilization of public refrigerated warehouse space was 59 percent for coolers and 77 percent for freezers on January 31. This level of utilization was about equal to the 5-year average occupancy for January but was less than that reported last year when cooler occupancy was 61 percent and freezer occupancy 79 percent. Although country wide use of cooler space was about average for this time of year, above average cooler occupancy prevailed in the Middle Atlantic, West North Central, East South Central, and Mountain regions while above average freezer occupancy prevailed in the New England, Middle Atlantic, East North Central, and Pacific regions.

Total foods held under refrigeration on January 31 amounted to 4.6 billion pounds. Of this amount 2.6 billion pounds were in freezer rooms, which is a record high for this date. During January there was a net reduction in stocks of almost all freezer stored commodities with the exception of butter, frozen juices, and pork which brought the total weight down 2 percent from the month before. Cooler held items reflected a net weight decrease of 14 percent during January as stocks of fresh fruits, vegetables, dairy products and eggs were reduced by amounts greater than the seasonal net increases in stocks of nuts, nut meats and meat products.

Almost 15 million bushels of apples were reported in storage on January 31 which compares with more than 18 million in store this time of year during the 5-year period ended 1953. Last year national holdings were slightly above 15 million bushels.

A record January net reduction in frozen fruit stocks brought total holdings down to 327 million pounds. The net disappearance of 30 million pounds was comprised largely of frozen strawberries (14 million pounds), cherries (7 million pounds), and raspberries (3 million pounds). Although holdings of frozen fruits were above average for this time of year (327 million vs 279 million) stocks of frozen apricots and grapes were the only fruit items reported to



End of Month Occupancy Public Cold Storage Warehouses 1947-1953

TABLE 1—COLD STORAGE HOLDINGS IN PUBLIC, PRIVATE AND SEMI-PRIVATE WAREHOUSES, APPLE HOUSES AND MEAT PACKING PLANTS (000 LBS.)

	Jan. 1954	Dec. 1953	Jan. 1953	Five Year Average
Beef	227,433	249,054	263,921	189,236
Pork	389,231	326,098	595,546	627,300
Other Meats and Meat Products	142,099	140,734	178,563	149,993
Frozen Poultry, lbs.	265,818	275,887	261,072	257,970
Creamery Butter, lbs.	293,842	281,702	85,737	59,467
American cheese, lbs.	395,494	401,168	194,286	158,782
Other cheese, lbs.	18,208	20,109	19,565	16,891
Shell eggs, cases	76	89	120	193
Frozen eggs, lbs.	37,524	42,030	34,980	49,156
Apples, bu.	14,895	19,894	15,265	18,220
Frozen fruits, lbs.	326,728	356,800	264,350	279,734
Frozen vegetables, lbs.	629,171	704,586	494,893	383,187
Frozen fish, lbs	153,388	176,249	170,263	140,481

TABLE 2—PERCENTAGE OF SPACE OCCUPIED BY PUBLIC REFRIGERATED WAREHOUSES (APPLE HOUSES EXCLUDED)

	Net Piling Space (000 cu ft)		Jan. 1954 (%)		Dec. 1953 (%)		Jan. 1953 (%)		5-Year-Average (%)	
	Cooler	Freezer	Cooler	Freezer	Cooler	Freezer	Cooler	Freezer	Cooler	Freezer
New England	2,977	7,484	38	82	42	84	36	73	48	81
Middle Atlantic	29,495	37,989	59	77	67	78	59	77	57	76
East North Central	26,728	28,543	61	87	64	88	62	86	61	80
West North Central	11,847	21,307	70	78	76	79	57	82	63	85
South Atlantic	9,802	13,165	60	69	62	69	65	75	60	80
East South Central	2,373	3,989	73	79	78	81	72	87	67	86
West South Central	8,644	10,651	62	60	63	63	74	75	63	65
Mountain	1,486	4,251	59	73	52	75	54	77	52	77
Pacific	16,413	31,366	49	74	50	78	60	75	57	72
United States	109,765	158,745	59	77	63	78	61	79	59	77

be below average for January 31. Frozen orange juice stocks were increased by 6 million gallons during January to total 18 million gallons by the end of the month.

An all-time record net withdrawal of frozen vegetable stocks—75 million pounds — was reported during January. Frozen vegetables in store totaled 629 million pounds whereas the month before 704 million pounds were on hand. Current holdings of frozen vegetables were more than 25 percent greater than a year ago and almost two-thirds greater than average for January 31. Without exception stocks of all frozen vegetable items were seasonally in lesser supply on January 31 than the month before. Frozen peas were reduced by 23 million pounds to 132 million; lima beans were down 12 million pounds to 82 million. Snap beans totaled 59 million pounds—down 11 million from the month before while frozen sweet corn stocks at 70 million pounds reflected a net increase of 8 million pounds.

Creamery butter holdings were increased by 12 million pounds during January to total almost 294 million pounds. This compares with 86 million last year and 59 million during the 5-year period ended 1953.

American Cheddar cheese stocks were reduced by almost 6 million pounds to bring national holdings down to 395 million pounds by the end of January.

Only 76,000 cases of eggs were on hand January 31 while the quantity of frozen eggs was reduced to less than 38 million pounds. Only twice before since 1927 have frozen egg stocks been as low on January 31.

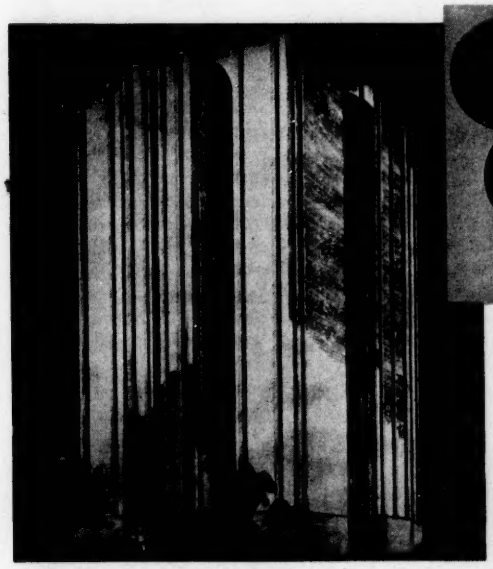
Poultry holdings were reduced by twice the average amount for January. The 10 million pound reduction compares with an average January reduction of 5 million and a reduction of 18 million pounds last year. Stores of turkeys were up to 124 million pounds by January 31.

A net decrease in frozen beef stocks brought the national total down to 218 million pounds. Current holdings were under last year's stocks but were about one-fourth above average for January 31. Holdings of frozen pork were increased by almost 46 million pounds bringing stocks up to 249 million pounds. These stores, however, were 141 million pounds under last year's stocks and 144 million pounds under the January 31 average holdings. Total pork stocks of 389 million pounds represented an increase of 63 million pounds over the previous month. This net storage gain was only about one-half as great as average for January and was about 40 percent less than the storage gain last year.

January 31 cold storage holdings of fishery products totaled 170 million pounds. This compares with 189 million pounds last year and 158 million pounds on hand January 31 during the 5-year average period ended 1953. Frozen fishery stocks were down 23 million to 153 million pounds by the end of January while cured fishery stocks at 17 million pounds were only 2 million pounds under last month's stocks.

Storage Outlook

The 4 point decline in cooler utilization during January brought cooler occupancy down to the 5-year average level for the month. By the end of February occupancy may be down by as much as 4 points again if the historical pattern prevails. Utilization of freezer space during February should also be less than the month before and by the end of February occupancy may be as low as 75 percent as selected dairy products, frozen fruits, vegetables, poultry, and beef move out of storage.



PRESSTITE
ENAMELITE "330
bonds and seals insulation in Miller High Life Stockhouse !

Approximately one million board measure of insulation in Miller Brewing Company's new stockhouse have been bonded, sealed and finished with *cold applied* Enamelite No. 330.

The most common cause of insulation failure is due to moisture penetration followed by freezing-thawing cycles. By forming a permanently impervious barrier against moisture-vapor infiltration, Enamelite No. 330 seals in the maximum efficiency and long life of rigid, low-temperature insulation.

Enamelite No. 330 is a cold mixed, cold applied asphaltic mastic which maintains volume constancy, develops a bonding strength in excess of 100 lbs. per square inch and remains tough, flexible and elastic indefinitely. It resists acids, alkalies, brine, salts and gases.

Your refrigeration facilities can be improved by Enamelite No. 330, proven by 23 years of outstanding performance. Write today for the new Enamelite catalog, containing full technical information.

Sealants, Adhesives and Coatings for Automotive, Refrigeration, Construction, Appliance, Railroad, Aircraft, Communication and other industries.

Sealing Compounds by PRESSTITE

PRESSTITE ENGINEERING COMPANY

3772 Chouteau Ave. St. Louis 10, Mo.

And Now — Air Conditioned Space Ships

SPACE ships of the future will need air conditioning systems for their human operators, who can never be replaced by machines and computing systems, the Los Angeles section of the American Society of Heating and Ventilating Engineers was recently told.

Speaking on the subject, "Air Conditioning of Space Ships," Frederick H. Green, assistant manager of preliminary design for AiResearch Manufacturing Company of Los Angeles, told the assembled engineers that air conditioning requirements for space ships cannot be eliminated by substituting automatic control equipment.

"Complex mechanisms need the same environment as human beings," he said. "In fact, for some control functions, human beings are more efficient because they occupy less space and weigh less."

This air conditioning system in a ship flying with no outside atmospheric pressure must not only control air temperature and circulation, but cabin air pressure and chemicals in the air as well, Green said.

Since there will be no atmosphere, oxygen must be provided as part of the air conditioning system. This will be in the form of liquid oxygen, Green said, because it will weigh less, and will give off cool oxygen when it boils into a breathable form.

An absence of gravity will mean that there will be no natural convection of air. Warm air will not rise and be replaced by cold air, as it does on the earth. A man confined to a small area would soon be surrounded by carbon-dioxide from his own exhaling, eventually causing his asphyxiation. Machinery would be affected the same way, and would heat and break down. Thus, forced circulation reaching into every corner of the ship will be essential.

Radiant heat from the sun will be exploited by the air conditioning system. By using the theory that black absorbs heat from the sun and white reflects it, the radiant heat can be controlled by painting one side white and the opposite side black and turning one side of the ship or the other to the sun.

With no atmosphere to draw on, air in the cabin will have to be reused during the lengthy trip. This would lead to an accumulation of carbon dioxide and other impurities in the cabin. Carbon dioxide will probably be removed chemically, the same as on submarines.

Other impurities would be removed by condensation. For this the radiation principle would be put to good use. Air circulating through the air conditioning system will pass over a surface 100 to 200 degrees below zero. Impurities such as methane gas and tobacco tars will be reduced to liquids and deposited.

Human beings and many machines are inefficient when humidity reaches far above or below normal, and water will be needed to control the humidity in space ships, according to Green. In order to save weight, scientists are taking steps to reclaim water from such sources as body waste products and fog in the air conditioning system. Cabin air pressure control must be provided if the passengers are going to live.

A problem still unsolved is the danger of air leaks in the cabin, Green said. When the pressurized cabin develops a leak, the passengers will faint before they have time to find it. Some automatic sealer will have to be devised, and the pressure will have to go back to normal automatically to revive those who passed out.

Liebmann Ice Plant Remodeled

REMODELING and revamping of the old Liebmann ice plant in the 100 block North Choctaw, El Reno, Oklahoma, has been announced by Paul Liebmann. Head offices of all Liebmann properties, now located at 118½ South Bickford, will be moved to the new location about April 1.

About one-third of the old ice building, or about 1,600 square feet of floor space will be utilized, providing for a reception room, outer office, rest rooms, a walk-in vault, and separate offices for the executives. Total cost of the remodeling project will be around $20,000. Property behind the building will be used for parking.

At the present time five persons are employed in the El Reno office, and a sixth will be added after the move, Mr. Liebmann said. Approximately 80 people are employed by all Liebmann plants.

The El Reno office handles business of its four ice plants in Pampa and Borger, Texas, and Oklahoma City and Muskogee; the Liebmann Production company with production projects in Oklahoma City; the Chandler Well Service Co., Chandler; Paloduro Theatre Co., Texas; The Griffith Realty buildings in Texas and Oklahoma.

Anheuser Busch to Build Brewery in New Orleans

PLANS to build a brewery in the New Orleans area, costing an estimated $20,000,000 have been announced by Anheuser Busch, Inc. The new brewery will employ about 500 people and will have a capacity of about 1,000,000 barrels a year.

Negotiations are in progress with the Illinois Central Railroad Company for a 150 acre tract owned by the railroad in Jefferson Parish across the river from New Orleans.

DIMCO CAST ALUMINUM FIN EVAPORATING COIL

★ *Saves Space*

★ *Saves Weight*

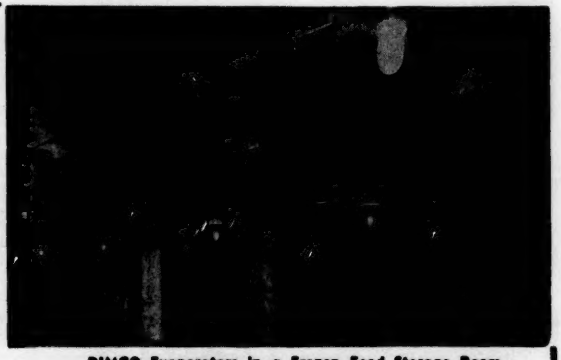
★ *Saves Cost*

CAN BE USED WITH ANY REFRIGERANT

Write for descriptive folder

DETROIT ICE MACHINE COMPANY

2615 Twelfth St., Detroit 16, Mich.



DIMCO Evaporators in a Frozen Food Storage Room at Great Lakes Terminal Warehouse, Toledo, Ohio. A typical installation facilitating palletizing.

Ammonia Accident Kills Brewery Worker

A BREWERY pipe-fitter died of suffocation by ammonia fumes and three others were hospitalized in an accidental rupture of a pipe line at a New Orleans, La., brewery January 26. A large quarter-section malt storage bin being hoisted into place fell on an elevated four-inch ammonia gas line between buildings when a crane tipped over.

Malt storage bin resting on ruptured ammonia lines. Arrow points to break.

Fumes apparently struck the pipefitter directly, severely burning him about the face, chest, arms and shoulders. The assistant coroner declared death to be by suffocation from fumes. Police crash truck and fire department rescue crews found the deceased on the floor between two tanks just inside the boiler room doorway, where he had fled from the accident.

Nine fire companies, comprising 54 men, answered the alarm as well as nearly two score policemen. For more than an hour steam and water were sprayed on the pipeline and in the storage room before anyone could get close to the scene without a gas mask. The fitter's helper, the crane operator, and other brewery and construction personnel escaped any serious injury, although eight of them required resuscitation. There was no explosion. City and state officials are investigating.

Book Review

FRUIT AND VEGETABLE JUICE PRODUCTION. By Donald K. Tressler and Maynard A. Joslyn. Published by the Avi Publishing Company, New York. 30 chapters. 962 pages. 163 illustrations. Cloth bound. Price $15.00 postpaid, domestic; $15.75 postpaid foreign. For sale by Nickerson & Collins Co., 433 N. Waller Ave., Chicago 44, Ill.

Twenty specialists in food research collaborated with Drs. Tressler and Joslyn to produce this entirely new book. Each chapter has been written by an expert who has devoted years of study to the topic about which he has written. The American fruit and vegetable juice industry has made remarkable progress since "Fruit and Vegetable Juices" appeared in 1939. Such advances have been made in the technology of the preparation, preservation, concentration and utilization of juices that it has been necessary to rewrite the book and include a great deal more material.

This book is of interest to all those engaged in the manufacture and preservation of fruit and vegetable juices and to those who may be considering entering these important industries, since it contains the latest information concerning the chemistry and technology of these products and their by-products. Further, all canners, freezers and dehydraters of fruit and vegetable products will find the chapter on utilization and disposal of processing wastes of special interest, since many of the juice by-products may be made from waste from other fruit and vegetable preservation industries. It fills a very real need for an authoriative treatise concerning one of the most important and rapid growing of the food industries.

The authors are men with years of experience in the field of frozen foods and food technology. Dr. Tressler is scientific director, Quartermaster Food and Container Institute for the Armed Forces; and Dr. Joslyn is Professor of Food Technology, University of California and Biochemist in the California Agricultural Experiment Station, Berkeley, Calif.

User Pays Cost of Iced Sweet Corn

A RECENT issue of the American Vegetable Grower has the following to say about corn icing: "A check has shown that the icing operation does not affect the costs of the grower or shipper who performs the job. The consumer who really wants his corn garden fresh, pays the added cost. Many stores that offered iced sweet corn along with conventional corn discovered that the most repeat sales were on the iced corn even though it was priced high enough to cover the cost of the icing operation along the line."

The icing of sweet corn in wet-strength paper bags was the brain child of the Research Committee of the National Association of Ice Industries. The development of the method came out of NAII-sponsored research.

Pipe Lowered with Ice

ENGINEERS in Henrico County, Va., faced the task of lowering 800 feet of 18-inch water main without interrupting service. It could be done with rope at the risk of bursting one of the joints. So they used Ice—1,100 pounds of it, cut into 25, 50 and 100 pound blocks. Used as supports under the pipe after the excavation was completed, the melting ice lowered the pipe from one to four feet as needed.

KOOLER KUBES
*Trademark International Salt Company, Inc.
50-lb. cubes of heavily compressed salt.
Dissolve evenly. Keep brine at constant Salometer strength.
Eliminate labor, guesswork, measuring, waste.
Uniform! Clean! Reduce icing of coils. Prevent clogged nozzles.
Try them today. Or, for information, write INTERNATIONAL SALT CO., INC. Scranton 2, Pa.
For Refrigeration with UNIT COOLERS or SPRAY DECKS

Mechanical Refrigeration Safety Code Revised

REVISION of the American Standard Safety Code for Mechanical Refrigeration have been approved by the ASRE and the American Standards Association, effective December 23, 1953. These revisions, with numerals referring to paragraphs in the 1953 edition, as contrasted to the 1950 edition, are as follows: (Copies of the Revised Code may be procured from The American Standards Association, 70 East Forty-fifth Street, New York 17, N. Y.)

1.1—The "Scope" is revised to specifically exclude equipment installed on railroad cars, motor vehicles, or ships. This represents no change in the intent of the Code.

*1.2—Wording concerning "recognized testing laboratory" is made more specific to indicate that equipment listed by testing laboratories is deemed to meet the factory design and test requirements of the Code. This represents no change of intent but clarifies the function of testing laboratories. NOTE: Underwriters' Laboratories qualifies as such a testing laboratory. Refrigeration equipment is included in the U/L Electrical Equipment List.

2.34 & 2.35—"Machinery Room" definitions now apply only when Section 6 requires an indirect system to be located in a machinery room; no change in intent.

2.45—"Pressure Vessel" definition clarified so that exemption of vessels with separate sections not exceeding ½ cubic foot of refrigerant volume applies only to evaporators; no change in intent.

3.6—"Industrial Occupancy" definition clarified so that it applies to an entire building or portion of a building, *provided* the entire building is occupied by a single tenant. No change in intent.

5.1.1—Carrene 7 added to Group 1 refrigerants.

6.1.3(c)—Restrictions on running Group 1 refrigerant piping through floors relaxed somewhat so that a pipe duct is not required when piping passes through spaces served by a direct system. Permission is granted whether the direct system is used for air conditioning or any other application.

Table 1—Carrene 7 added.

6.2.1.1—Wording clarified so that there is no limit on the number of individual self-contained systems containing up to 20 pounds of refrigerant; no change in intent.

6.2.1.2 & 6.2.1.3—These paragraphs were formerly listed as notes under Table 1. 6.2.1.2 contains a new limitation; when a direct system serves various stories of a building the story having the smallest volume limits the amount of refrigerant rather than the volume of the entire building.

6.2.2—Permits refrigerant piping in an indirect system to be carried through floors of a building if enclosed in a pipe duct in accordance with Paragraph 6.1.3. The 1950 Edition only permitted refrigerant-containing parts "mounted outside the building" to be located outside the machinery room.

6.3.1, 6.3.2 & Table 2—These Paragraphs and Table 2 were revised for clarification. The only substantive change is that Group 2 refrigerants in direct systems are prohibited for air conditioning for human comfort in Institutional, Public Assembly, Residential and Commercial Occupancies. In the 1950 Edition this prohibition did *not* apply to Commercial Occupancies.

6.3.2.1.1—Permits refrigerant piping on an indirect system to be carried through floors of a building if enclosed in a pipe duct in accordance with Paragraph 6.1.3. The 1950 Edition only permitted refrigerant-containing parts "mounted outside the building" to be located outside the machinery room.

7.2—Wording of Industrial Occupancy revised to specify more clearly that the requirements of Commercial Occupancy only apply when required number of exits are not provided and the occupancy exceeds one person per 100 square feet of floor area above the first floor. This change intended to avoid possible misinterpretation of the 1950 wording.

8.10—Flammable refrigerants exceeding 1,000 pounds can only be used with approval of city or state authorities. In the 1950 Edition this limitation only applied in "built up" areas.

8.11.4—In Class T Machinery Rooms located in basements the mechanical ventilation must operate continuously. In the 1950 Edition the requirement was that "adequate" ventilation should operate continuously without specifying the exact amount.

Table 5—The heading in the last column of Table 5 covering window or door areas for machinery rooms is clarified to indicate that the windows and doors need not be kept open continuously and that the area is computed by determining the "openable" area; i.e. in the case of double-hung windows, the area is ½ of the total area of the window.

9.3.2—An up-to-date ASTM Specification is inserted for iron pipe size copper and red brass pipe and tubing.

9.3.3—This Paragraph covers watertube size hard copper tubing *installed in the field*. An up-to-date ASTM Specification for Type K and Type L tubing is inserted. After considerable standardization activity, it has been decided that tubing with outside diameter ¼ inch shall be not less than 0.030 inch of wall thickness; for ⅜ inch tubing the wall thickness shall be not less than 0.032 inch. The 1950 Edition permitted wall thicknesses of 0.025 and 0.030 for ¼ and ⅜ inch tubing.

9.3.4—The requirements for soft copper tubing *installed in the field* have been brought up to date by a new ASTM Specification number. As a result of standardization activity, the wall thicknesses of ¼ and ⅜ tubing have been established at 0.030 and 0.032 inches; as contrasted to 0.025 and 0.030 in the 1950 Edition. To simplify compliance with the Code, a table of wall thicknesses is inserted for the first time.

9.3.5—Clarification of wording regarding brazing of pipe joints for Group 2 and Group 3 refrigerants; no change in intent.

9.5—Refrigerant pipe joints on field-erected systems must henceforth be exposed for visual inspection before being enclosed. Exemptions in the 1950 Edition made this provision practically meaningless.

*10.2.1—A new paragraph covering pressure testing has been added. Under the wording of 10.2 in the 1950 Edition it was recognized that a pressure vessel might be tested to a high pressure and be equipped with a pressure relief device set to correspond to the vessel's resultant higher design working pressure. Other components in the system might be designed and tested at a lower pressure based on the test pressures in Table 6 and, thus, they might not be adequately protected by the safety relief device. To avoid this possibility, the new paragraph requires that the test pressure on the high and low sides must be at least equal to (a) the design working pressures of vessels on the high and low sides, or (b) the setting of pressure relief devices on such high and low side vessels. Also, that any components connected to pressure vessels shall meet the design requirements of 10.1,1.

On field-erected systems in which such "high pressure" vessels are installed, this means that the component parts must be subjected to a higher test pressure equal to the design pressure of the vessel *unless* a reduced relief valve setting is used. With a reduced relief setting, the Table 6 values or pressure relief setting (whichever is higher) will determine the test pressure.

*10.4.1—The 1950 Edition provided an exemption from the pressure limiting device requirement (high pressure cutout) for water cooled systems containing less than 3 pounds of Group 1 refrigerant, if the system would "safely relieve the refrigerant" in case of water failure. The new wording makes this requirement more specific, and is consistent with Underwriters' standards by stating that the exemption applies if the pressure does not exceed one-fifth of the ultimate strength of the system in the case of water failure. writers standards by stating that the

*10.4.2—An additional limitation on the setting of the pressure limiting device is included: this limitation is 90% of the design working pressure of the high side of the system. Formerly the setting could not exceed the lower of two figures: 1) 90% of the relief device setting; or 2) 90% of the leak field test pressure actually applied. This new wording avoids the possibility of setting the high pressure cutout above the design working pressure of the system.

*Section 11—The wording covering refrigerant-containing pressure vessels is simplified and brought up to date by reference to the 1952 ASME Boiler and Pressure Vessel Code. Except for the adoption of the 1952 ASME Code instead of the 1949 Edition, the requirements for pressure vessels will continue as before. In general, this means that vessels up to 6 inches in diameter will be tested by a "recognized testing laboratory"; vessels over this diameter and up to 5 cubic feet of refrigerant-containing volume will have the "UM" stamping; and vessels of over 5 cubic feet will have the ASME "U" stamping.

12.3—The requirements covering the venting of pressure relief devices and fusible plugs for Group I refrigerants have been changed. The 1953 Edition requires that devices on direct systems containing over 100 pounds of refrigerant shall be vented to the outside of the building; systems installed in machinery rooms need not have relief devices vented to the outside.

12.3.1—In the 1950 Edition discharge of pressure relief devices into the low side of the system was permitted, provided the low side was protected by relief devices vented to the outside of the building. The 1953 Code specifies the capacity and setting of such low side relief devices.

*Section 13—The Section covering relief devices for pressure vessels is completely rewritten. The important changes are as follows: (1) Dual pressure relief is required on vessels of 10 cubic feet or more; in the 1950 Edition this requirement applied to vessels of over 5 cubic feet. (2) Fusible plugs are permitted on vessels of 3 cubic feet or less of capacity; in the 1950 Edition fusible plugs were permitted up to 5 cubic feet or less. (3) Pressure vessels of less than 3 inches inside diameter are exempt from pressure relief requirements. In the 1950 Edition relief on vessels up to 6 inches when listed by a "recognized testing laboratory" was left to the discretion of such laboratory; this provision has been deleted. (4) Carrene 7 is added to the refrigerant table in Paragraph 13.5.

14.1.1—The 1950 Edition required high and low side pressure testing on all field-erected piping in accordance with Table 6. It has been recognized that on small systems it is not practical to cut off the high and low side and apply separate pressure tests as specified in Table 6. Thus, new Paragraph 14.1.1, covering Group 1 systems using copper tubing up to ⅝ inch O.D., was added to permit the leak pressure test to be conducted by charging refrigerant into the system at 70° F or more.

Table 6—Carrene 7 added. Wording in note (a), applying to refrigerants not listed in Table 6, is revised.

14.2.1—An added safety requirement for field pressure testing is inserted, requiring a pressure limiting device or a pressure reducing device and gauge on the outlet side of the equipment used to build up the test pressure.

Paragraphs in which there is a minor change in wording *with no change of intent*, are as follows: 2.49, 3.1, 3.7, 6.2.1.4, 10.1.1, 12.1.5, 14.3.

* Denotes items affecting the manufacture and design of refrigeration equipment; the other changes affect only the installation of equipment.

BIG TONNAGE CONTROL FOR SHELL AND TUBE COOLERS

75 to 200 TONS F-12

with ALCO

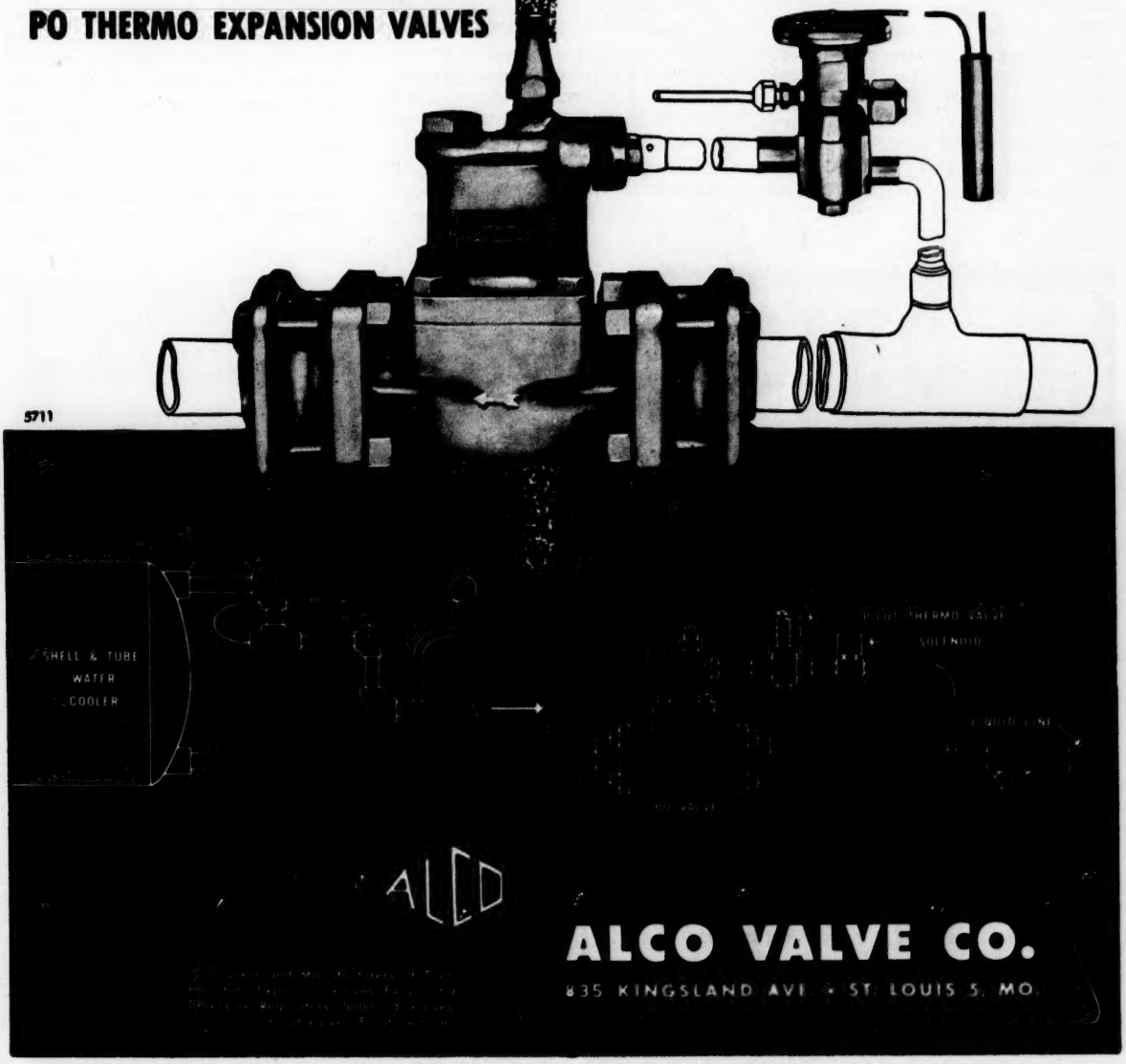
PO THERMO EXPANSION VALVES

Alco PO Thermo Valves have only a few moving parts. Any change in superheat operates a small pilot Thermo Valve which automatically controls the PO Valve.

Both pilot and main valves have Alco's famous come-apart construction. Like all Alco products, they are easy to install and service.

May we send you FREE our PO Bulletin with complete technical information and installation data?

SEE YOUR ALCO WHOLESALER



Pointers on Operation of Freezer Storage

A LEAFLET on some factors affecting efficiency in the operation of freezer storage has been issued by the National Association of Refrigerated Warehouses, sponsored by the warehouse operations committees of NARW. The following pointers are listed:

Coil temperatures in freezers should operate with a maximum temperature differential between room temperature and coil temperature of 10 F. (5 F is much better). To accomplish this:

Keeps coils well defrosted.

Provide additional pipe when necessary.

Eliminate any avoidable sources of heat load in rooms, i.e., insulation leaks, air infiltration leaks, excessive quantities of warm product, unnecessary lights, etc.

Compressors should be operated with as high suction pressures as possible. Remember that as the suction pressure of a given compressor goes down its capacity in tons of refrigeration goes down while simultaneously the horsepower required per ton of refrigeration goes up. Example:

An 8 x 8 ammonia compressor operating at 400 rpm with a 155 lb. head pressure has the following ratings: 20 lb. suct. pres.—42.5 tons-57.9 bhp-1.36 hp ton; 10 lb. suct. pres.—28.6 tons-49.7 bhp-1.74 hp ton; 0 lb. suct. pres.—14.3 tons-35.7 bhp-2.49 hp ton.

To raise the operating suction pressure of an existing system more evaporating surface must be made effective.

In a direct expansion system the following may accomplish the desired results:

Make certain that all existing coils are fully operating. Hand expansion valves and thermostatic expansion valves sometimes tend to starve the coils and thus reduce the effective usable coil surface. Check all valves or change to flooded system.

Add more coil surface. In a brine system the following may help:

Make certain that brine coolers always operate with the liquid ammonia level as high as possible.

If temperature difference between ammonia and leaving brine is more than 10 F provide additional brine cooler.

If brine cooler operates with more than 3 F between entering and leaving brine add more brine circulation and probably more brine coils in freezer rooms.

Plenty of coil surface and plenty of brine cooler surface, in the long run, provides the cheapest operation and incidentally the highest relative humidities.—*Cold Facts.*

Drained Weight of Frozen Cherries and Berries

THE question whether or not delay between pitting, packing and freezing as well as rate of freezing, affects drained weight of frozen RSP cherries, is the subject of study now under way at the Eastern Regional Research Laboratory, Philadelphia, Pa. of the USDA Bureau of Agricultural and Industrial Chemistry.

Since this problem has for years been a cause of concern also to packers and users of frozen berries, especially strawberries, and has never been comprehensively examined nor solved, investigations of this phase of the drained-weight problem are being carried on in the Western Regional Research Laboratory, Albany, Calif. These investigations are being encouraged by research and technical personnel of the frozen foods, preserve and ice cream industries. TRRF Information Bulletin.

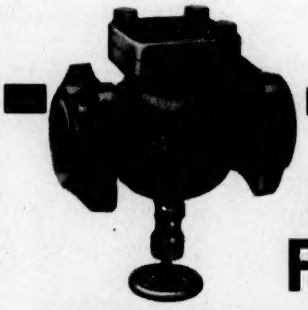
OHIO SPECIAL ICE CANS

WELDED — RIVETED

ICE CAN GRIDS

Industrial Trucks and Trailers

THE OHIO GALVANIZING & MFG. CO.
NILES OHIO



SQUARE FLANGED

AMMONIA CHECK VALVES

Standard sizes range from 1 to 4 inches, in both Angle and Straight-Way styles. Screw Ends are available from ½" to 2" sizes, and in Round Flanged style from 5" and larger on application.

Wolf-Linde Ammonia Valves and Fittings give you sturdy construction of quality material, precision machined in compact design, with free flow and long service life. The Standard of Quality since 1880.

Write for Catalog and Price List

WOLF-LINDE VALVES

DERSCH, GESSWEIN & NEUERT, Inc.
4849 W. GRAND AVENUE CHICAGO 39, ILLINOIS

Frozen Food Packers

(Continued from page 36)

James E. Tully, president, New England Frozen Food Distributors, Watertown, Mass., said only 10 percent of the population has tasted prepared frozen foods and two percent has accounted for most of the sales. He declared that prepared frozen products now are equal, or superior to, canned or fresh counterparts, both in quality and price, and have the added quality of convenience.

Among other developments at the convention was the announcement that the National Association of Frozen Food Packers would complete more than 10,000 nutritional tests in its nutrition research program. The tests, conducted by the Wisconsin Alumni Foundation, are to determine the occurrence of eight vitamins, six minerals, and seven components in 48 frozen products.

Carrier Plans Expansion

THE Carrier Corporation is scouting the South for a site for a $5,000,000 air conditioning plant, according to Cloud Wampler, Carrier Corporation president, who said he hoped that a site would be found and the plant in production by the Fall of 1955.

Strawberry Packers Build Cold Storage

A NEW $100,000 cold storage plant and processing room is to be built in San Martin, Calif., near the Driscoll strawberry plant it has been announced by Paul Musolino, president of the San Martin Cold Storage Company. The cold storage building will contain about 12,000 square feet and will increase the quick freezing and storage space by 25 percent, bringing the total quick freezing capacity at the plant to 200 tons every 24 hours and the cold storage to approximately 300 cars.

Phillips Refrigeration Products of San Francisco are design engineers on the storage building. Russell H. Fuller is design and structural engineer on the processing building.

Union Ice Builds Cold Storage Addition

A COLD storage addition is under construction for the Union Ice Company at Claremont, California, to cost about $40,000.00 It will increase the company's storage facilities by some 75 carloads, bringing the total capacity to 425 carloads, according to Mark H. Bailey, Jr., manager.

New Standards for Frozen Apples

THE U. S. Department of Agriculture has announced a proposed revision of the U. S. Standards for Grades of Frozen Apples, which have been in effect since June 3, 1952. The proposed revision provides for more similarity of the grade requirements with those of canned apples of comparable quality, particularly with respect to the factor of defects. Interested persons have until March 5, 1954, to submit views or comments on the proposed standards to the Fruit and Vegetable Division, Agricultural Marketing Service, U. S. Department of Agriculture, Washington 25, D. C.

Expanded Space for Frozen Food

THE increased demand for frozen food storage space has caused the Albuquerque Ice Company, Albuquerque, New Mexico, to start its second expansion. The company is adding 20,000 cubic feet at a cost of $15,000, according to Walter T. Elliott, vice-president and general manager. This will bring the total space to 150,000 cubic feet. The firm's chief engineer, John Young, is in charge of the expansion project.

64 Frequently Used Tables
125 Pages of Text
8 Page Topical Index

The Accepted Vest Pocket Reference for Refrigeration Men

- *Convenient 2½" x 5" Vest-Pocket size.*
- *Durable Flexible Cloth Binding.*
- *Rules and formulas based on actual practice.*
- *A Practical Book for the Practical Engineer.*

One of refrigeration's oldest and still most frequently used reference by operating engineers in plants using refrigeration equipment. Tables and concise statements on hundreds of subjects enable you to select equipment, make alterations and load calculations with confidence.

Over 25,000 copies sold to refrigeration men throughout the world.

Send for your Vest Pocket Memoranda today.

NICKERSON & COLLINS CO.
433 N. Waller Ave., Chicago 44, Ill.

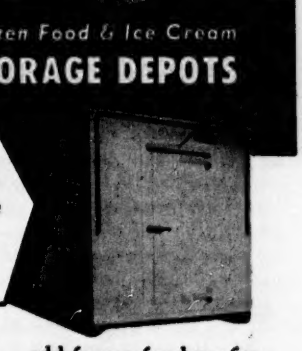
Price **$1.00**

S&S ICE VENDING STATIONS
and Ice Vending Equipment

AUTOMATIC! REFRIGERATED! DEPENDABLE!

S&S Frozen Food & Ice Cream **STORAGE DEPOTS**

For Independent, Outside Refrigerated Storage! . . . Complete Ready to Plug In! Portable!



Slash distribution costs . . . add frozen food profits for chain stores and super-markets!

Sold by Leading Ice Equipment Distributors Throughout the Nation

S&S VENDING MACHINE COMPANY
670 Lincoln Avenue San Jose, California

New Cork Insulation for Dual Temperature Pipe Lines

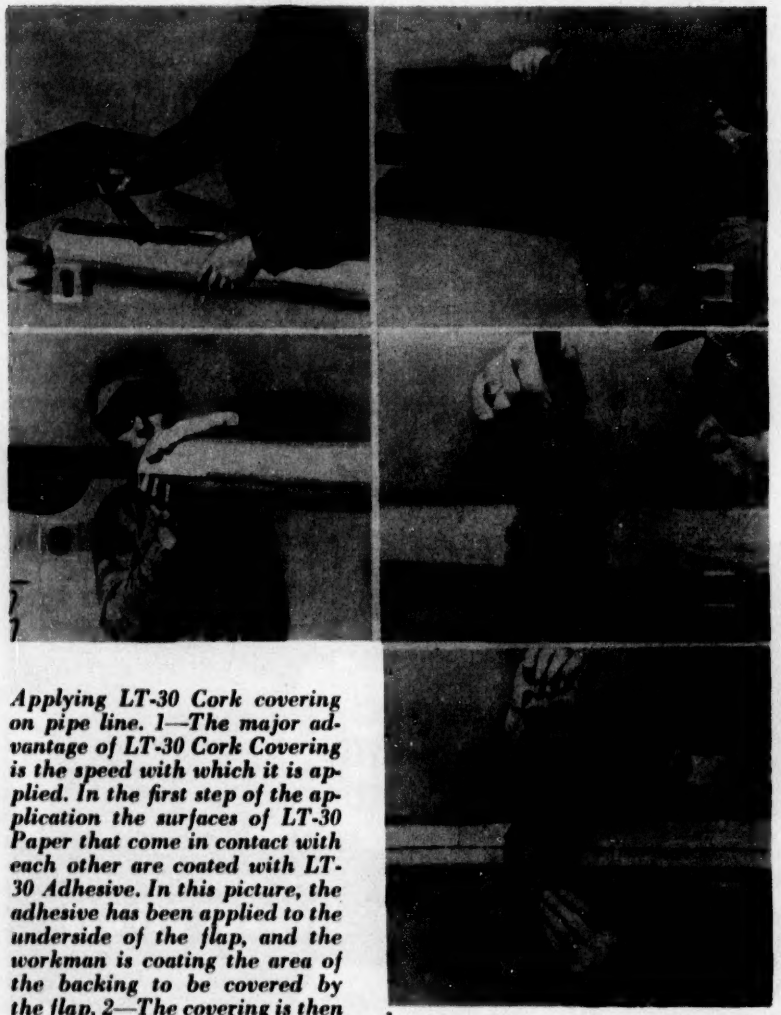
A NEW design of cork pipe insulation that may be applied more rapidly and with substantial labor savings has been developed by the Armstrong Cork Company for use on dual temperature lines where moderate service conditions prevail. Called LT-30 Cork Covering, the new insulation is applied by merely wrapping it around the pipe.

LT-30 is designed for use on air-conditioning systems and on chilled water and other cold lines where the liquid temperatures in the line are 30 F or above, and relative humidity of the surrounding air does not exceed 70 percent. On the hot water cycle, the new covering will withstand temperatures up to 200 F.

LT-30 Cork Covering is fabricated from precision-cut segments of Armstrong's Corkboard adhered to a specially developed three-ply vaporproof paper. The covering is manufactured with a lap of LT-30 Paper at a longitudinal joint. It is furnished in 36 inch lengths to fit accurately all standard pipe and copper tubing sizes ¼ inch to 12 inches.

Installation of the new covering needs no wires, bands, or seam filler to apply, no cloth, twine, or paper to wrap around the insulation, and no need for a further indoor finish unless desired. With these advantages, installation costs are reduced. The only sundry items needed for application, adhesive and strips of paper, are shipped with the material.

In application, adhesive is applied to the overlap and the area it will cover. The covering is wrapped around the pipe and held firmly in place and the lap firmly pressed into position, effecting a vaportight seal. A strip of LT-30 Paper also is pasted over the end joints. This paper is a specifically developed, sturdy, flexible backing which provides positive resistance to vapor penetration, and fast positive adhesion.



Applying LT-30 Cork covering on pipe line. 1—The major advantage of LT-30 Cork Covering is the speed with which it is applied. In the first step of the application the surfaces of LT-30 Paper that come in contact with each other are coated with LT-30 Adhesive. In this picture, the adhesive has been applied to the underside of the flap, and the workman is coating the area of the backing to be covered by the flap. 2—The covering is then positioned on the pipe with the flap downward to form a watershed. Adhesive should be dry to the touch before application of covering. The precision-cut cork segments fit together perfectly. No adhesive need be applied to them. 3—The covering is held firmly in place, so that all the cork segments are in tight contact with each other. Flap is then pasted down by first running thumb along the paper at the longitudinal joint. The rest of the flap can then be pressed firmly in place. 4—Before sealing the end joints, adjacent sections of covering are aligned. LT-30 adhesive is applied over the area of the backing to be covered by the strip. At the same time, a band of LT-30 Paper about 4 inches wide should also be coated with adhesive. 5—When the adhesive is dry to the touch, seal the strip in place. Adhesive must also be applied to the area to be covered by the flap of the strip. Where a deluxe finish is desired, Armstrong's Insulcolor, in white or one of several colors can be applied.

ASRE Moves—New Office 234 Fifth Avenue, N. Y.

THE American Society of Refrigerating Engineers announces that on and after March 1, 1954 its Headquarters office will be located at 234 Fifth Avenue, New York 1, N. Y.

The Society will occupy the entire third floor of the new location which has been redecorated, partitioned and air conditioned to conform with the requirements of the operating personnel.

The removal from its present location, 40 West 40th Street, New York City, where it has been for the last ten years, is due to the building owner desiring to use the entire building for its own personnel.

Charter Presented to Dayton Section ASRE

A CHARTER was presented to the new Dayton, Ohio Section of The American Society of Refrigerating Engineers at a dinner meeting recently. Arthur J. Hess, national president of the ASRE, presented the charter. The meeting featured two speakers; Adm. George F. Hussey (Ret.), managing director of the American Standards Association, and George S. Jones Jr., managing director of the Air Conditioning and Refrigeration Institute.

Admiral Hussey discussed "What Standards Have Done to Promote the American Economy" and Mr. Jones, "Air Conditioning, Today and Tomorrow." Mr. Jones is a past president of the National Sales Executive club.

Fresh Grapefruit Storage

MUCH interest centers now on use of bags, such as polyethylene, for the storage of fruits, since such means offers the possibility of modification of the storage atmosphere by restraint of the emanations that accumulate from respiration of the fruit. Likewise, some encouraging, as well as discouraging, results have been reported from use of plastic and aluminum foil liners for fruit boxes. A general fact that can be gathered from research on modification of atmosphere and so-called gas storage is that many factors require pretty rigid control. These include the maturity and variety and also the portions of carbon dioxide and oxygen in the atmosphere. The respiring fruit constantly changes the atmosphere. Fungal and bacterial factors also affect the environment.

From the Refrigeration Research Foundation aided project on citrus storage conducted by U. S. Department of Agriculture in cooperation with industry, there is a report of use of polyethylene bags of fruit, held at 32 F in storage in New York. The atmosphere within the bags was partly controlled by breaking of seals at definite times to admit fresh air. Some samples showed promise for short periods but those held as long as nine weeks were unsuccessful because of decay during the week at room temperature following storage. With continued confinement in the bags (no breaking of seals), the fruit became soft and unflavored.

Thus far, this project has yielded no more than four weeks of successful storage of grapefruit at 32 F, with some value apparent from treatment with Dowicide A and hexamine and also with 2-aminopyridine-phyrrolidone.—TRRF Information Bulletin.

Liebmann Purchases Western Breweries

LIEBMANN Breweries Inc., of New York has acquired the Acme Breweries of San Francisco and Los Angeles. Negotiations for the sale had been in progress several weeks. Both the Los Angeles and the San Francisco plants will be controlled by a subsidiary of Liebmann Breweries Inc. The new owners plan on spending some six million dollars to expand the two plants.

COMING CONVENTIONS

NORTH CAROLINA ICE ASSOCIATION
March 8-9, 1954
Sir Walter Raleigh Hotel, Raleigh, N. C.
LEWIS W. POWELL, Secy.-Treas.

THE REFRIGERATION RESEARCH FOUNDATION
April 21-22, 1954
Edgewater Beach Hotel, Chicago, Ill.
April 25-28, 1954
• Boca Raton Hotel, Boca Raton, Florida
H. C. DIEHL, Director

AMERICAN WAREHOUSEMEN'S ASSOCIATION
April 25-29, 1954
Boca Raton Hotel, Boca Raton, Florida
WM. DALTON, General Secretary

NATIONAL ASSOCIATION REFRIGERATED WAREHOUSES
April 25-29, 1954
Boca Raton Hotel, Boca Raton, Florida
WM. DALTON, Executive vice-president

NATIONAL ASSOCIATION PRACTICAL REFRIGERATING ENGINEERS
November 2-4, 1954
Roosevelt Hotel, New Orleans, La.
J. RICHARD KELAHAN, Secretary

Phillips Float Controls are available in capacities of 1 to 1000 tons for "Freon" and 1 to 2000 tons for ammonia. Consult with Phillips engineers on applications of Phillips Float Controls for your present equipment or specifications on new units. Just call on us . . . we'd like to help.

Write for Catalog

H. A. PHILLIPS & CO. DESIGNERS AND ENGINEERS REFRIGERATION CONTROL SYSTEMS
3255 W. CARROLL AVENUE • CHICAGO 24, ILLINOIS

Representatives: The C & S Equipment Co., 2103 S. San Pedro St., Los Angeles, Cal.
Mason Emanuels Co., 90 Dearborn St., Seattle 4, Wash.

Perfection
ICE SCORING MACHINE COMPANY

Today, labor costs eat into your profits. The Perfection Ice-A-Teria, fully automatic vending machine, actually pays for itself from savings on labor. More than that, however, you can offer your customers 24-hour service. The Perfection Ice-A-Teria is adaptable to fill your needs. Write, wire or phone today for complete information.

P. O. Box 2140 Fort Worth, Texas Phone ED-1258

DEATHS

H. O. Hill

THE death of H. O. Hill, Tallahasse, Florida, president of Middle Florida Ice Company, occurred recently at his office. Mr. Hill was for many years a prominent member and leader of the Florida Ice Association. He served as its president in 1931 and 1932 and since that time has served on the executive committee. He also served a term as president of the Florida Bottlers' Association.

He was a member of the First Baptist Church and one of its deacons for many years. He was active in Red Cross work and served as chairman of the local chapter for many years. He was a member and past president of the Tallahasse Kiwanis Club and a member of the Tallahasse Elks Lodge. He is survived by his two sons and one daughter. Mrs. Hill died in 1943.

Thomas M. Smith

THE death of Thomas M. Smith, president of the Houston Terminal Warehouse & Cold Storage Company, Houston, Texas, occurred January 19 of a heart attack. He was 63. Mr. Smith came to Houston in 1920. He joined the Texas Warehouse Company as a shipping clerk. Later he joined the Houston Terminal Warehouse as manager of sales and business promotion. In 1937 he was named vice-president and operating executive and in 1943 he became president and general manager.

He was a member of Anchor Lodge 424 A.F. and A.M. of San Antonio, the Scottish Rite Bodies, Arabia Temple Shrine, the Allied Food Dealers, Fellowship Club, the Houston Warehouse and Transfer Men's Association and was a deacon in the Second Presbyterian Church. He is survived by his widow, Mrs. Elizabeth Callaway Smith, two daughters and a son.

FRED J. GUDERIAN, chief engineer, National Ice and Fuel Corp., Chicago, Ill., and who has been with the company for the past 29 years was fatally injured in an automobile accident January 22. With Mr. Guderian in the car at the time were his wife, Gertrude, and two young daughters, Barbara 16 and Judy 14. Mrs. Guderian and her daughters were not seriously injured. Mr. Guderian was a member of the Practical Refrigerating Engineers Association and I.U.O.E. Local 399. He is survived by his father, George Guderian, who was chief engineer for the company until 1948 when he retired and Fred Guderian took over the position of chief engineer.

Iran Requests Bids on Cold Storage Equipment

THE Iranian Ministry of National Economy, in collaboration with the U. S. Operations Mission to Iran, plans to construct a bonded warehouse in the port of Khorramshahr, Iran, under the provisions of a project agreement to be signed in the near future. Offers will be accepted until March 15, 1954, by the Procurement Officer, U. S. Operations Mission to Iran, c/o American Embassy, Tehran, Iran.

Offers are requested for the supply and erection of refrigerated storage space in the port of Khorramshahr, with a capacity of 1,000 tons of dried fruit and 2,000 tons of dates, in boxes measuring 16½ x 10⅞ x 5⅜ inches and 19⅜ x 10¾ x 9¾ inches and weighing 12½ and 32½ kilograms, respectively.

The existing warehouses are of standard construction with brick walls approximately 20 inches thick and corrugated iron roofs. Summer temperatures often attain 120 F. DB (in the shade) and 90 F. WB.

It is desired to store the dates and dried fruit at a temperature of under 75 F with a relative humidity of not more than 70 to 75 percent. The loading of the storage space, it is expected, should be completed in about one month.

The refrigeration equipment should be guaranteed new to operate either with Freon-12 or ammonia but preference will be given to Freon-12. Complete specifications and capacities should be given.

Condensers should be of the shell and tube types, suitable for sea water and easily cleanable. Condenser tube material should be specified.

Individual water circulation pumps should be provided with a total head of at least 40 feet plus the pressure drop throuugh the condenser.

Power is available at 220-380 volts, 50 cycles, 3 phase. Motors of 20 hp and up should be equipped with reduced voltage starters.

Prices should include all equipment and materials, plans, and the services of a qualified refrigeration engineer to supervise the installation, but not masonry or labor for construction work. Offers should state approximate shipping dates from port in the United States. Payment is to be made by irrevocable letter of credit.

Firms desiring additional details on design and construction should communicate with the Procurement Officer, USOM/Iran, c/o American Embassy, Tehran, Iran. All communications relating to this project should refer to serial number 430-4143.

News of PEOPLE

LOUIS N. RUSO, general manager of A. L. Ruso Inc., frozen food processing firm in Watsonville, Calif., has assumed additional duties of sales manager of the firm. The company recently appointed G. L. Youmans of Watsonville to the managership of its newly acquired storage plant in Atascadero. Others appointments at the Atascadero plant were Frank Viarengo, field manager, became production manager, John Holman, assistant manager, and Mrs. Jean Godwin, traffic manager.

JOSEPH KONTE, a driver for the National Ice and Cold Storage Company, San Francisco, Calif., is reported by one of his associate drivers, Bill Phillipps, as having a dozen uniforms and seven pairs of shoes. He wears a fresh uniform every day from head to foot, according to Bill. Joe was nominated and elected as a member of the Dapper Dan Club sponsored by a San Francisco Newspaper.

DR. SAMUEL C. PRESCOTT, chairman of the Board of The Refrigeration Research Foundation has been honored by selection to receive the first annual service award of the "49 ers", an organization that serves the Canning Machinery & Suppliers Association. Dr. Prescott's pioneering research contributions and service to the canning industry is widely recognized and this is a fitting and deserved honor.

"DUTCH" (DR. H. C.) DIEHL, director of The Refrigeration Research Foundation, has been elected to membership at the Cosmos Club, Washington, D. C., which includes in its membership officers of national organizations and leaders in various fields of science, engineering, humanities and exploration.

E. W. WINTERMANN, president of Tyler Warehouse & Cold Storage Co., St. Louis, Mo., has received patent rights on the method and apparatus for air conditioning an enclosure wherein the temperatures and humidities are automatically controlled. Mr. Wintermann uses this equipment for candy storage.—Cold Facts.

JACK MENDENHALL, manager, Ketchikan Cold Storage Co., Ketchikan, Alaska, has been named to fill the recently formed third U. S. membership on the International Pacific Halibut Commission.—Cold Facts.

KARL LINSER, former owner of a popular shoe repair shop in Van Wert, Ohio, has closed his shop and will head the Van Wert Ice & Supply plant. Sale of this plant to Eli Rager, of near Payne, was announced along with Linser's selection as manager.

MANUFACTURERS' NEWS

Worthington Appointments

THE appointments of John E. Lancaster as chief engineer Heavy Machinery Section, and Roland G. Ewer, as consulting engineer, Air Conditioning and Refrigeration Division have been announced by M. M. Lawler, vice-President Worthington Corporation.

A graduate of Marybelle College and New York University, Mr. Lancaster joined the Research Department at Worthington in 1940 and in May 1948 became assistant manager of this department. He served as acting manager of the research department from May 1952 until September 1952 when he was named assistant chief engineer of the Air Conditioning and Refrigeration Division.

Mr. Ewer joined the Carbondale Machine Company after his graduation from Stevens Institute of Technology in 1907. He served as draftsman and field engineer until his appointment as mechanical engineer in 1915. He later served as sales manager and engineer of sales. When Worthington purchased the Carbondale Machine Co. in 1934, he was named chief engineer.

Shanklin Heads New Carrier Distributorship

A DISTRIBUTORSHIP in Louisville, Kentucky, is to be established for test purposes under the temporary control of Carrier Corporation, Cloud Wampler, president of the pioneer air conditioning firm, has announced. This distributorship will be headed and partly owned by Arthur P. Shanklin, for many years a vice-president of Carrier Corporation.

In making this announcement, Mr. Wampler stated, "The action taken does not represent any change in our basic distribution policies. But we believe that the new company can be used advantageously to test various aspects of Carrier's sales, merchandising and product programs."

Mr. Shanklin is a native of Lexington, Kentucky. He has been a member of the Carrier organization ever since receiving his degree in mechanical engineering from the University of Kentucky in 1922.

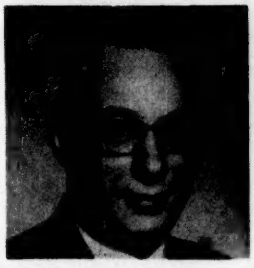
Infringement Suit

YORK Corporation, of York, Pa., was named defendant, with the Jefferson Standard Life Insurance Company as co-defendant, in a suit for patent infringement brought in the United States District Court in Greensboro, N.C., by Carrier Corporation of Syracuse, New York. The complaint asks that triple damages be assessed against York for alleged infringement of Carrier's U. S. Patent 2,363,294.

The installation which allegedly infringes the Carrier patent is in a building owned by the Jefferson Standard Life Insurance Co., Greensboro, N.C.

Yost Joins Pittsburgh Corning

FRANCIS A. YOST, has been appointed construction engineer for the Pittsburgh Corning Corporation. Mr. Yost will act as a construction consultant for applicators, with emphasis on cold storage work, making his headquarters at One Gateway Center, Pittsburgh 22.

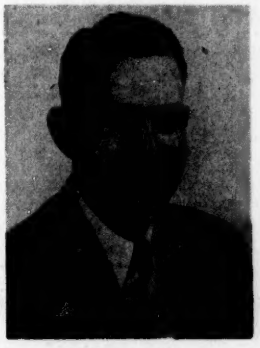


Francis A. Yost

Mr. Yost is a member of the N.A.P.R.E., the Engineering Society of Western Pennsylvania, Sigma Beta Sigma, the American Institute of Electrical Engineers, and was a former president of the Plant Engineering Association of Pittsburgh. He was formerly plant engineer for the Fried & Reineman Company, Pittsburgh.

Kelly Joins Ballard Sales

THE appointment of Oran Kelly as a new sales representative to replace Dan Driscoll, who resigned to enter another business has been announced by Joe J. Ballard Jr., of the Ballard Sales Co., Fort Worth, Texas. Mr. Kelly, a native Texan, has



Oran Kelly

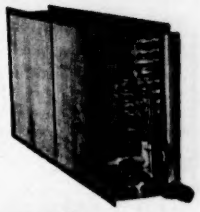
worked in the ice industry since graduating from high school in his home town of Spearman, Texas. He joins Ballard Sales Company after a long and experienced background in the ice industry. He has built and maintained ice plants, has been plant engineer and plant manager, and has traveled the field, selling ice appliances.

LOOK TO REMPE

PIPE COILS—FIN COILS

FOR REFRIGERATION, AIR CONDITIONING HEATING

Rempe Coils are accepted in the industry as quality equipment that is built for long service without maintenance. Rempe Coils are used on the most difficult jobs and forgotten. This confidence has been earned the hard way—through proper engineering, good quality materials and precision manufacturing.



Coils and Bends of any metal or design engineered to your requirements. Send us your problems for engineering assistance.

A request on your letterhead will bring free copy of new Engineering Data Book on Pipe and Fin Coils.

REMPE COMPANY

548 N. Sacramento Blvd., Chicago 12, Ill.

ACME....

the Only Gas Mask with the "PICTURE WINDOWS"

You never have that "jammed-in" feeling, wearing the Acme Full-Vision Gas Mask. Its patented, larger lenses are like picture windows, giving you full natural vision for that safe, unconfined feeling. When you walk, you can actually see your toes without bobbing your head. This factor alone makes Acme outstanding among gas masks . . . well worth looking into.

Write for the complete story on Acme Gas Masks for the Refrigeration Industry.

ACME PROTECTION EQUIPMENT COMPANY

3037 West Lake Street, CHICAGO 12, ILL.

Vending Installations

THE following companies have made recent installations of S & S Vending Equipment:

Colorado Ice & Cold Storage Co., Denver, Colo., two stationettes.

Patruno Ice Service, Middletown, N. Y., one 9 x 24 station.

David Ice Co., Jacksonville, Fla., two 8 x 16 stations.

City Ice Delivery, Tulsa, Oklahoma, three 9 x 24 stations.

Bell Spring, Herrington, Kansas, one 9 x 20 station.

Tropical Ice Co., New Orleans, La., two 9 x 24 stations.

City Products Corp., Cleveland, Ohio, two 9 x 20 stations.

Seaboard Service, Eatontown, N. J., one stationette.

Hilton Ice Co., Homestead, Penna., one 8 x 20 station.

Citizens Ice & Coal Co., Mattoon, Ill., three units.

Earlington Ice Co., Earlington, Ky., two units.

Losquardo Coal Co., Weehawken, N. J., one unit.

City Products Corp., Cleveland, Ohio, two units.

Intake-Exhaust Silencers

TWO new series of silencers for quieting the noise produced by air compressors, blowers, vacuum pumps and other machines expelling high velocity air to atmosphere have been developed by Burgess-Manning engineers, Libertyville, Ill. To be known as the Series "CA" and "LCA", they are designed for operation under moisture-free air conditions and for temperatures up to 200F.

Both series are acoustic type silencers employing straight-through acoustically transparent perforated tubes surrounded by a deep layer of special, highly efficient, sound absorbing material and, therefore, featuring minimum restriction to air flow. Special sound absorbing material can be used for operations of considerably higher temperatures than the standard of 200F. The "CA" Series is available in pipe sizes up to 6 inches, whereas the "LCA" Series is available in sizes larger than 6 inches.

Carrier Earnings

FOR the fourth consecutive fiscal year, Carrier Corp., makers of air conditioning equipment, reported new highs in earnings, completed sales and orders booked. Net profit for the 12 months ended October 31, 1953, was $6,107,134. On the basis of 1,404,643 shares of common stock outstanding at the end of fiscal 1953, per-share earnings were equivalent to $4.19 a share. In the previous fiscal year, Carrier Corp. earned $4,522,512, which was equivalent to $4.89 a common share on each of the 883,051 common shares outstanding as of October 31, 1952.

Carrier Corp. issued 278,422 shares of common stock during the last month of 1953 fiscal period, the proceeds from this financing totaling $8,490,016. Preferred shares of the company also were converted during fiscal 1953, resulting in the issuance of an additional 243,170 shares of common. During fiscal 1953 completed sales of Carrier totaled $164,437,530 and new orders were booked in the amount of $176,078,143. The corresponding figures for the preceding period were $107,700,702 and $103,971,261, respectively.

CATALOGS AND BULLETINS

Catalog on Metal Hose

A 32-PAGE illustrated catalog on all types of Flexon Metal Hose has been released by Flexonics Corporation; formerly Chicago Metal Hose Corp.; Maywood, Ill. This catalog covers the full range of the company's manufacture in Rex-Weld corrugated metal hose, Rex-Tube convoluted hose types, Rex-Flex stainless steel flexible metal hose, and numerous special purpose assemblies. Featured is new industrial Rex-Flex heavy duty stainless steel hose. Also covered are coupling types and installation information.

Folder on Insulation of Trucks and Trailers

A NEW illustrated eight-page booklet published by Gustin-Bacon Manufacturing Co., Kansas City, Mo., outlines methods of insulating refrigerated truck bodies and trailers. It also contains tips on perishable cargo handling. The booklet is of interest to shippers, fleet operators and body builders. Descriptions of over-the-road tests and weathering and torture tests are included as well as a section listing requirements for truck body and trailer insulation, including suggested insulation thickness.

Control Selection Guide

LATE selection information on motor starters and push-buttons is contained in a new publication announced as available from the General Electric Company, Schenectady 5, N. Y. Designated as GEA-6061, the six page, two-color bulletin provides buying information on a-c magnetic motor starters (1/6 to 50-hp), a-c combination starters (½ to 25-hp), push-button stations, a-c manual motor starters, and magnetic reversing controllers. In addition to rating and suggested prices, the publication contains photos of the equipment, circuit diagrams, and brief application data.

G. E. Bulletin on Controls

THE full line of G-E oil-tight push buttons, indicating lights, selector switches, and accessories is described in a new four-color, 16-page publication announced as available from the General Electric Company, Schenectady 5, N.Y. Designated as GEA-5779B, the booklet explains how these equipments operate and where they can be used. Included are cross-section drawings, full color application photos, dimension and outline diagrams, and complete ordering information.

Handbook Gives Hints On Vacuum Pump Care

PRACTICAL tips on installing, operating, and maintaining vacuum pumps and vacuum systems are contained in "How to Care for Your Vacuum Pump," a new 16-page handbook issued by F. J. Stokes Machine Company, Philadelphia, Pa.

The manual, intended for all who install, operate and service vacuum pumping equipment contains such helpful hints as: the proper way to make leakproof connections in vacuum piping layouts; recommended types of gages, valves, fittings and gaskets; step-by-step trouble-shooting procedures to be followed when the pump is knocking, will not start, or will not produce a satisfactory vacuum; and some 25 "Do's" and "Don'ts" to insure long and trouble-free service life of vacuum systems.

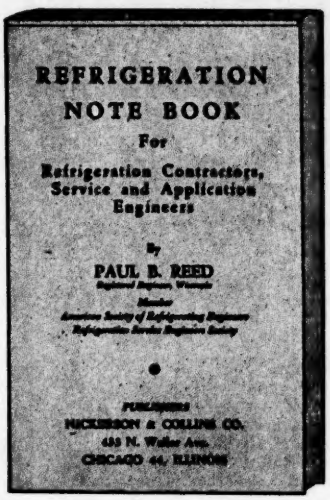
FRED OPHULS
& ASSOCIATES
Consulting Engineers
112-114 West 42nd St. New York City 36
Ice Making and Refrigeration
Industrial Power Plants
Reports, Appraisals and Management

ZIMMERMANN ENGINEERING
Air Conditioning — Heating —
Ventilating — Plumbing
Electric — Refrigeration
Industrial — Commercial — Domestic
Designs — Evaluations — Specifications
Legal: Inspections, Reports, Testimony
500 - 5th Avenue, New York 36, N. Y.
LOngacre 3-5965-6
A. Urban Zimmermann
Consulting Engr.

VAN RENSSELAER
H. GREENE
ENGINEERS
COMPLETE PLANT DESIGNS INCLUDING BUILDING AND EQUIPMENT
11 PARK PLACE NEW YORK 7, N. Y.

A Vest Pocket Book of Valuable Data REFRIGERATION NOTE BOOK

by **PAUL B. REED**



Vest Pocket Size—3¼ x 5 inches
204 Pages—Flexible Binding

THIS NOTE BOOK of condensed refrigeration information represents many years of work in accumulating practical data—"culling out" all extraneous material—so as the author states, "the reader will find a handy and easily carried source of information not usually kept in memory."

You will be surprised at the wealth of material that has been included in this convenient and practical reference Note Book. It is written in layman's language, without complicated formulas. In short, it is a tool responsible for the operation of refrigeration equipment.

$2.00 Postpaid

Nickerson & Collins Co., Publishers
433 N. Waller Ave., Chicago 44, Ill.

FOR SALE—COMPLETE ICE PLANTS
20 tons to 150 tons
AMMONIA COMPRESSORS
12½x14½ York with 175 h.p. motor
10x10 York—direct connected to 100 h.p. syn. motor
9x9 Frick—V belt drive to 60 h.p. motor
8x8 York—V belt drive to 75 h.p. motor
7½x7½ Baker—V belt drive
2—7x7 Fricks—V belt drive 30 h.p. motors
3x3 & 4x4 self-contained units
MISCELLANEOUS EQUIPMENT
Link-Belt crusher slinger with 10 h.p. motor
Type 100 F&E automatic cuber
130 h.p. 3 cyl. Superior Diesel engine 600 rpm.
50 h.p. motor 2300 volts—75 h.p. syn motor 300 rpm.
75 h.p. motor 720 rpm.—11½x22½x45" ice cans
JOHN F. CARSON
"A & Venango Sts. Philadelphia 34, Pa.
Phone GArfield 6-2221

Classified Advertising

All classified advertisements are payable in advance. Except for Positions and Help Wanted classifications, this section is reserved exclusively for USED equipment.

RATES: 20c per word; minimum 25 words. $2.00 per line for bold face headings. $15.00 per inch for line listings.

ICE PLANTS—for sale

FOR SALE—Zenith 3 ton portable ice plant, with 10 ton motor and extra compressor for storage room. Operate at present location or move. Zenith Ice Co., Box 414, Garden City, Kansas.

FOR SALE—25 ton ice plant equipment complete and modern. Installed new by Frick Company in 1948. Perfect. Sacrifice. Dismantling plant. Ralph P. Jones, 3714 Commerce St., Dallas, Texas.

FOR SALE—Liquidating complete ice plant. 1600 300 lb. cans, 9x9 Frick with 75 h.p. synchronous motor, 12x24 Frick twin with 250 h.p. synchronous motor, shell and tube condenser, ice tank, 3 ton Detroit crane, four single shell brine coolers, 6 ton Transfer crane, can filler, Connersville pump, air compressor and other equipment. Located Saginaw. Gordon Equipment Co., 6530 W. Jefferson Ave., Detroit 17, Mich.

FOR SALE—at sacrifice—30 ton Frick ice plant. Just shut down; everything in excellent condition. Fairbanks Model 32D 150 h.p. Diesel; Frick 10x10 Type H compressor; 230 volt alternator; 15 h.p. water pump; shell and tube condensers; receiver; purger; 360 cans 11"x22"x50"; freezing tank with 4 can electric pull; blower, core sucker, dip tank, dump and can filler, Gifford-Wood Type F scorer. Sell complete or any part. Write Stewart Ice Inc., 45 Valleyview St., Oneonta, N. Y.

USED EQUIPMENT—wanted & for sale

FOR SALE—25 h.p. Westinghouse self-contained unit, Model LU 850 220/440, with controls. New June 1948. Make offer to D. F. Vater, The Cracker Jack Co., 4800 W. 66th St., Chicago 38, Ill.

FOR SALE—10"x7" Worthington booster compressor. 7½x7½, 8x8, 9x9 Yorks, splash lubrication. 15 h.p. Servel Freon compressor. Write E. Niebling, 1546 St. Clair, Mt. Healthy, Cincinnati 31, Ohio.

FOR SALE—5¼x4 stroke Brunswick-Kroeshell ammonia compressor complete with base, outboard bearing and split Vee-pulley flywheel; completely over-hauled and in first class running condition; $395.00 or will consider trade. Divine's Machine Works, Albany, Georgia.

WANTED—100 good second-hand low pressure ice cans. Size 11x22x48", inside measurement. Write Malden Ice & Fuel Co. Inc., Malden, Missouri.

FOR SALE—One Gifford-Wood type "QR" portable tiering machine with structural steel frame, for tiering 7-tiers of 300 lb. ice cakes, equipped with 1 h.p. motor, with motor mounted brake for 3 phase, 60 cycle 220/440 volts. Overall height of machine 13.0 feet. Used one season, price $500.00. One Lilly Co. Model U-400 upender, cost $750.00, used one season, $500.00. One Reinhold Jumbo cuber without motor, $100.00. Write Walter J. Lohr, 333 Ridge Road, Lackawanna 18, N. Y.

FOR SALE—Large number of extra long 400 lb. cans 64x22x11. Guaranteed no leakers; $3.00 each at our plant. Kosmos Ice & Fuel Co., 5810 S. Halstead St., Chicago, Ill.

FOR SALE—One 75 h.p. York 6 cylinder VW compressor motor unit, used. One 60 h.p. York 6 cylinder VW compressor motor unit, used. One 50 h.p. Chrysler Airtemp double end compressor motor unit—new compressors. Two 15 to 25 h.p. Schnacke compressor motor units unused. One used 50 ton Trane evaporator condenser. All at exceptionally low prices. Marc Air Conditioning & Refrigeration Corp., 360-362 Broadway, Brooklyn 11, N. Y.

FOR SALE—Frick and York 7½x7½ high speed with motor; 9x9 slow and high speed with motors; self-contained units; 10x10 slow speed; 6¼x6¼ high speed with motor; 9½x9½ and 10½x10½ Vilters. Cranes, can fillers, hoists, condensers, brine coolers, crushers, cubers, scoring machine, raw water equipment, cans, agitators, blowers. Parke Pettegrew & Son Co., 370 W. Broad St., Columbus 8, Ohio.

POSITIONS AND HELP WANTED

POSITION WANTED—Plant Engineer with complete knowledge of mechanical equipment of refrigeration systems, boilers and engines, qualified by training and experience, desires job in South or Southwest. Good reliable references. Address Box MR-3, c/o Industrial Refrigeration.

SALESMAN WANTED

We want a man who has faith in the future of the Ice Industry, with good character and integrity, to sell the best, most complete line of Ice Supplies in the U.S. Must be willing to travel, and own car. Established territory. This is a permanent position with opportunity for advancement and high earnings. Give full particulars in your reply to:

E. L. Mockler, Gen. Mgr.
Index Coupon & Supply Co.
612 Indiana Ave.
La Porte, Indiana

FOR SALE

USED ICE PLANTS AND REFRIGERATING EQUIPMENT

20 ton Ice Plant 240—300 lb. Ice Cans—4 Can Pull—Electric Driven
50 ton Ice Plant 616—300 lb. Ice Cans—7 Can Pull—Electric Driven
85 ton Ice Plant 1040—300 lb. Ice Cans—26 Can Pull—Diesel Driven

AMMONIA COMPRESSORS—

HIGH SPEED

6x6 York Y-26	6x6 York Y-28
6½x6½ York Y-28	6½x6½ York Y-38
7x7 Frick Type H	7½x7½ York Y-15
8x8 York Y-26	8x8 York Y-28
10x10 York Y-28	12½x14½ York Y-26

9x9 Frick type H capacity control D.C. 100 HP 360 RPM Syn. Motor
9x9 York Y-28 capacity control D.C. 100 HP 300 RPM Syn. Motor.
10x10 York Y-16 D.C. 100 HP 200 RPM Syn. Motor; 10x10 York Y-16 D.C. 70 HP 180 RPM Syn. Motor; 10x10 York Y-28 D.C. 100 HP 300 RPM Syn. Motor

ICE CANS

700 11x22x47" 300# Excellent Condition.
100 11x22x51" 300# Excellent Condition.
1000 11½x22½x44" 300# Good Condition.
Shell & Tube Ammonia Condensers, Brine Coolers, Receivers, Traps, Valves & Fittings.
1—Miller Perfection Ice Scoring Machine.

Write, wire or cable us on any equipment you need.

ENTERPRISE EQUIPMENT CORP.
77-79 Alexander St. Yonkers 8-8118-9
Cable Address: ENEQCO Yonkers, N. Y.

Vilter Compressors at Bay City Freezer, Inc., Bay City, Michigan

WANT A TWELVE-YEAR RECORD OF SAVINGS LIKE THIS?

CHECK with VILTER

In Bay City, Michigan, the Bay City Freezer company operates an ice plant, a cold storage plant, freezer lockers, and a frozen food packing plant. Naturally enough, refrigeration is a mighty important item to them, and the story of the savings they have made in the past twelve years—with Vilter equipment—is an interesting one.

Bay City Freezer, Inc. began operations in 1921, using horizontal refrigeration compressors. In 1942 they replaced them with two Vilter Vertical Compressors and a Vilter Booster. The immediate effect of the change was the availability of half their engine room space for storage, because of the compact Vilter equipment. Even more important was the fact that the automatic Vilter system let them use one engineer instead of three. Bay City Freezer *paid for the entire installation in a little more than a year.* Now, after twelve years, their Vilter equipment continues to pile up those savings. Naturally, they're "very much satisfied" with Vilter.

Perhaps refrigeration can't make savings like that in your plant . . . but it's almost certain that Vilter's knowledge of refrigeration coupled with the established lower operating and upkeep costs of Vilter equipment can bring about important savings to you. Plant after plant is saving money with Vilter. Probably you can, too.

Installed by Robbennholt-Ott Corporation, Saginaw, Mich.

Vilter.

Your nearby Vilter Distributor or Representative will be glad to show you how you can save money with Vilter.

REFRIGERATION and AIR CONDITIONING

THE VILTER MANUFACTURING COMPANY, MILWAUKEE 7, WIS.

Air Conditioning • Ammonia & Freon Compressors • Booster Compressors • Baudelot Coolers • Double Pipe Coolers • Blast Freezers • Evaporative & Shell & Tube Condensers • Pakicers • Pipe Coils • Valves & Fittings

ADVERTISERS

Acme Protection Equipment Co. 53
Alco Valve Co. 47
American Hair & Felt Co. 6
Armour Ammonia Div., Armour & Co. 5
Armstrong Cork Co. ..... Inside Back Cover
Armstrong Machine Works 37

Bateman Foundry and Machine Co., Inc. 38
Butcher Boy Refrigerator Door Co. 1

Chicago Nipple Mfg. Co. 39
Classified Advertising 55

Dersch, Gesswein & Neuert, Inc. 48
Detroit Ice Machine Co. 44

Enterprise Equipment Corp. 55

Frick Co. 41
Greene, Van R. H. 54

Henry Valve Co. 12
Howe Ice Machine Co. 35

International Salt Co., Inc. 45

Jamison Cold Storage Door Co. ..... Back Cover

Kramer Trenton Co. 10

National Pipe Bending Co. 7
Nickerson & Collins Co. 49
Nitrogen Div.,
Allied Chemical & Dye Corp. 11

Ohio Galvanizing & Mfg. Co., The 48
Ophuls & Associates, Fred 54

Pacific Lumber Co. 14
Perfection Ice Scoring Machine Co., The 51
Phillips & Co., H. A. 51
Presstite Engineering Co. 43

Refrigeration Engineering Co. 39
Rempe Co. 53

S & S Vending Machine Co. 49
Shank Co., Cyrus 38
Solvay Process Div. 33

Taylor Instrument Companies 9
Texas Co., The ..... Inside Front Cover

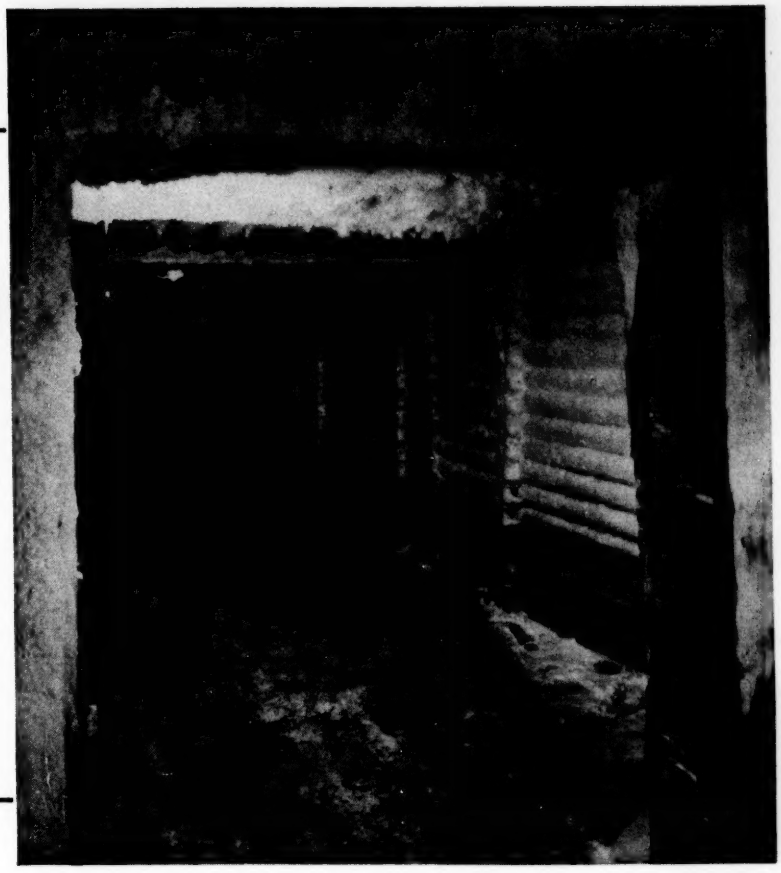
Vilter Mfg. Co., The 56
Vogt Machine Co., Inc., Henry 2

Wanted and For Sale Advertising 55

Zimmermann, A. Urban 54

How long has corkboard held this freezer at 25° below?

- ☐ 14 YEARS?
- ☐ 19 YEARS?
- ☐ 24 YEARS?



When this 25° below zero freezer was built for Cudahy Brothers in Milwaukee, it was the first of its kind in that part of the country. This was an especially important job, and Cudahy took no chances on construction. When it came to insulation, the best was used—10 inches of Armstrong's Corkboard.

That was back in 1930. Twenty-four years have passed since then, and the original corkboard is still on the job. Not a single piece has been replaced since the day it was installed. Still more years of trouble-free service can be expected by Cudahy.

This installation is just one of thousands that demonstrates the superiority of Armstrong's Corkboard. In many fields of industry, new materials are replacing older ones because they can do a better job. But in low-temperature insulations, no practical material has yet been found to equal corkboard for efficiency and dependability.

If you're planning low-temperature construction, be sure you get good materials and workmanship. When you call in Armstrong's Contracting Organization, experts will handle the entire job—from specifications through installation—and give you assurance of efficient, long-lasting performance. For full information, call your nearest Armstrong office or write Armstrong Cork Company, 2003 Skye Drive, Lancaster, Pennsylvania.

Complete Insulation Contract Service

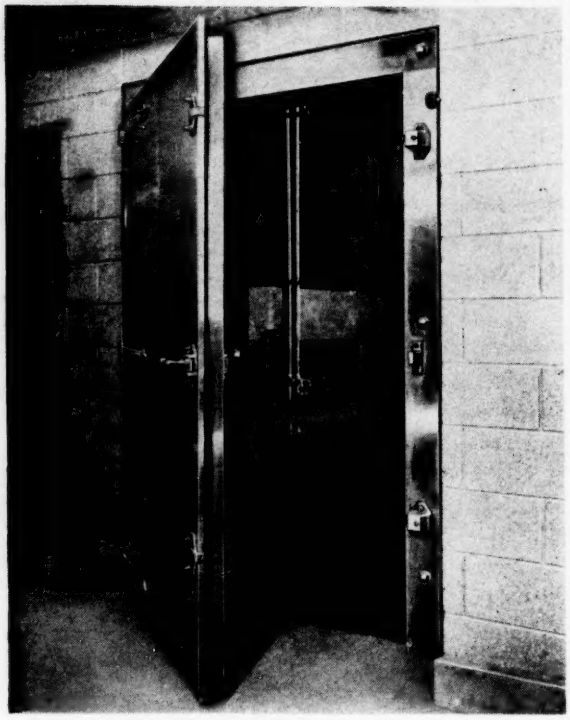
There are many factors that can't be written into an insulation contract, but which can largely determine whether or not the agreement will be entirely satisfactory. They include:

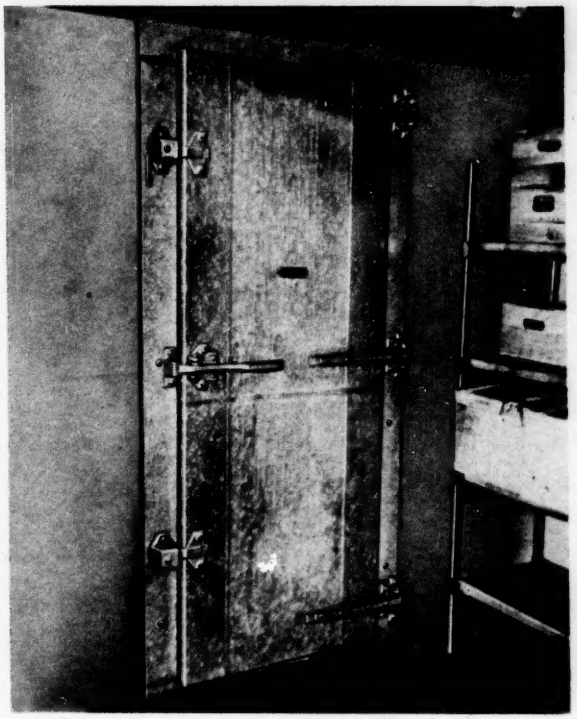
1. Financial responsibility—resources to complete the contract despite any unforeseen events.
2. Integrity—a reputation for quality work and for prompt settlement of any justified complaints.
3. Technical ability — experience, plus technical and research staff to do the job in accordance with best practices.
4. Manpower resources — trained supervisors and workmen able to handle any contract efficiently.
5. Efficiency — ability to deal with problems of accounting, tax provisions, insurance, and workmen's compensation.

You get all these with an Armstrong Contract

ARMSTRONG'S INDUSTRIAL INSULATIONS

For temperatures from 300° below zero to 2800° F.

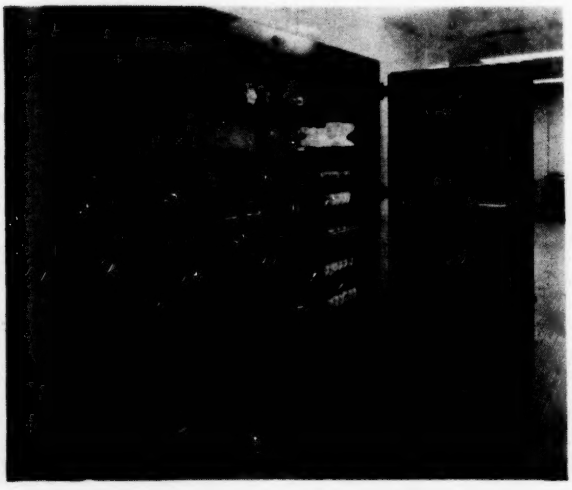




For Applications Down To −20° F.

Select JAMISON LO-TEMP Doors for Efficiency and Economy

For any low temperature application where an infitting door will best serve your purpose—down to −20°F.—the perfect door is a JAMISON LO-TEMP. It is an efficient infitting door, equipped with super-safe single seals, E-Z Open fasteners that maintain a tight seal but open with minimum effort with lever handle, and positive action Adjustoflex Hinges—stainless clad or Standard, woodback galvanized face. They work better, look better, stand up longer. For complete information, specifications and dimensions, write for Catalog Section 3, Jamison Cold Storage Door Company, Hagerstown, Maryland.



JAMISON

HAGERSTOWN, MARYLAND, U. S. A.

More JAMISON Doors are used by *more* people than any other Cold Storage Door in the world.